The Dissertation Committee for Herbert Leon Coleman Certifies that this is the approved version of the following dissertation:

THE PERSONALITY TRAITS OF INSTRUMENTALITY AND EXPRESSIVENESS IN RELATION TO MICROCOMPUTER PLAYFULNESS

Committee:

Paul E. Resta, Supervisor

Toni Falbo

Jill Marshall

Norvell Northcutt

Joan Hughes

THE PERSONALITY TRAITS OF INSTRUMENTALITY AND EXPRESSIVENESS IN RELATION TO MICROCOMPUTER PLAYFULNESS

by

Herbert Leon Coleman, B.S; M.Ed.

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Dedication

This dissertation is dedicated to my grandfather, Herbert Coleman, for whom I was named and countless other African-Americans who never had the opportunities I have to pursue an education. It is also dedicated to my parents Nora A. Brumsey and Edward I. Coleman who both taught me, in so many ways, that gender does not have to define your role or who you are.

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The Personality Traits of Instrumentality and Expressiveness in Relation to Microcomputer Playfulness

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Differences between females and males in computer use have long been a concern. Over the past twenty years, the accessibility gap has closed and women's use of the technology has equaled and in some cases surpassed men's computer use. However, differences in patterns of use still remain. This study looked at underlying factors that may be involved in maintaining differences in use. Specifically, this study focused on differences in gender and gender role personality traits as they relate to microcomputer playfulness. Gender role personality traits are defined as the acceptance of stereotypic gender descriptors as applying to oneself according to the Personal Attributes Questionnaire (PAQ). The PAQ provides participants with ratings on the expressive (feminine) and instrumental (masculine) scales. The relationship between the scales yields the gender role personality traits expressive (high expressive, low instrumental), instrumental (low expressive, high instrumental), androgynous (high on both), or undifferentiated (low on both). Microcomputer playfulness or computer playfulness is defined as the tendency to be "spontaneous, inventive and imaginative when interacting

with a personal computer." It is measured by responses on the Computer Playfulness Scale. This study found that computer playfulness varied depending upon setting with participants being most playful when using a computer at home and least playful when using a computer at work. Those who score in the androgynous range of the PAQ also scored higher on the CPS than those who scored in the undifferentiated range. Finally, this study found that males tended to score higher in computer playfulness than females. Participants were also interviewed about their experiences of gender role personality traits and computer playfulness. Discussion of these results and suggestions for further research are included.

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Chapter I: Introduction

As computer technology has become more present in everyday life, achieving computer skills has become more important to success in school and in the workplace (Igbaria and Baroudi, 1996). Schools are requiring that students be proficient in computers in order to complete assignments and conduct research while over half of all jobs require at least some computer knowledge and interaction. Individuals who develop computer skills stand a better chance at success in education as well as on the job. However, those individuals, who, for whatever reason, are not comfortable with the technology or do not achieve mastery may find themselves at odds with the new information economy. Individual difference in response to computer technology could mean the difference between the "haves" and the "have not's" in the near future.

In investigating individual differences in the world of human-computer actions many constructs have been used. Several of these constructs such as anxiety, attitudes toward computers, perceived self-efficacy, satisfaction, and enjoyment focus on individual traits that affect how one interacts with the computer. A less well-known trait, microcomputer or computer playfulness may be key in understanding why some people excel in activities related to computer use while others do not. Put simply, microcomputer playfulness is the tendency to be "spontaneous, inventive and imaginative when interacting with a personal computer" (Webster and Martocchio, 1992). When considering microcomputer or computer playfulness (CP), it is not a specific computer

activity, such as game playing, that brings out the playful spirit in the individual, but rather it is the interaction with the computer itself that the individual finds enjoyable. Those with the tendency to be playful when using a computer enjoy the activity and characterize the experience more positively than those who are less playful. In addition, those who are more playful when interacting with a computer also tend to stay engaged longer, experiment more and learn through exploratory activities (Lieberman, 1977). Thus, those who exhibit computer playfulness not only enjoy the experience but also tend to learn more from the experience, which creates a reinforcing feedback loop that helps to maintain their interaction.

The question might arise as to whether CP is a state or a trait? The answer is that it can be either or both. Some individuals exhibit playfulness when engaged in specific computer activities such as designing a webpage or engaging in online chats but do not exhibit playfulness when working on a spreadsheet or debugging a program. These individuals experience computer playfulness as a state. Others experience playfulness regardless of the activity. They can be just as playful debugging a program as playing a game or entering data into a database. This second group tends to be playful whenever they interact with the computer no matter what program they are using. They are considered to experience microcomputer playfulness as a trait (Webster and Martocchio, 1992). It is computer playfulness as a trait that is the focus of the current study.

The benefits of computer playfulness are many. Those high in CP are less anxious, more positive and more engaged when using computers. They also tend to be self directed and exploratory in their learning. For example, someone high in CP is more likely to explore

menu options and features in a new program and, in relatively short order, may master the functions of the program. Because of the intrinsic motivation, those high in CP tend to need less direction and less feedback in training (Martocchio and Webster, 1992). In many college and university computer engineering programs those who exhibit behaviors that are similar to computer playfulness such as extended periods of engagement, use of computers during leisure time, and exhibit greater satisfaction and enjoyment while involved with computers, tend to have higher degree completion rates than those who do not exhibit these types of behaviors. Those who drop out or change their majors often cite the comparison of their use of computers with that of those who are more highly engaged as leading to their sense of not belonging and the reason for leaving the field (Margolis and Fisher, 2002).

However, there is a potential downside to CP as well. Those high in CP might be tempted to spend more time tweaking documents or refining projects and thus take longer to complete them. They may tend to overuse the computer when another method might be sufficient while taking less time. In addition, those high in CP may have a tendency to engage in activities that may not be task-related either in work or school settings. There is limited research however, as to how likely the negatives are to occur. A study by Howell (2000), found that in relationship to web-based training, those high in CP actually made fewer exploratory choices than those lower in CP. This suggests that their computer behavior was more task-focused.

Another potential downside could be that of gender differences. The relationship between CP to gender was explored in a study of training and feedback (Martocchio and

Webster, 1992). The results of the study suggests that there are no differences in levels of engagement and enjoyment, as measured by the Computer Playfulness Scale (CPS), attributable to gender when differences in computing experience are controlled.

However, when looked at on a more macro level, Margolis, et al., (1999) found differences between males and females in engagement with computers. One example of this is that 73% of the males cited enjoyment of computers as the only reason they were majoring in computer science while only 25% of the females said the same. One male student exemplified this difference with his reaction to a lecture on how computers can be nonproductive:

> "Everyone just said how boring it was. Who cares that computers did not benefit anyone? We like computers! We love computers! We know computers! And who cares about the rest of the world." (Margolis and Fisher, 2002 p.53)

Additionally, more of the females (44%) were studying computers as a means of using them specifically to help people or in conjunction with other areas (such as medicine) rather than for the sake of computing itself. Only 9% of the males said the same. Females also seem to more frequently demonstrate a lack of confidence related to their skills in using computers. Even when they have completed advanced computer science courses in high school, girls were half as likely to characterize their skill level as "above average" and boys were 5 times as likely to expect a career in computer programming (Sax, 2001). One reason for this could be the intimidation factor that was best expressed by the female student interviewed for the Margolis study, who said,

> "When I have free time I don't spend it reading machine learning books or robotics books like these other guys here. It's like, 'Oh my gosh, this isn't for me.' It's like their hobby. They all start reading machine learning books or robotics books or build a little robot or something and I'm just not like that at all. In my free time I prefer to read a good fiction book or learn how to do photography or something different, whereas that's their hobby, it's their work, it's their one goal. I'm just not like that at all; I don't dream in code like they do."

The difference in engagement of computers between males and females often leads women to change their majors from computer science (Margolis, et al., 1999). This is despite the fact they frequently are earning grades on par with the male students. This difference is far from universal. Recall the 25% of women who responded that they also saw enjoyment of computers as the reason for their choice of a computer science major. In addition, there are males who find that the "geek culture" and hours spent on the computer during free time is not for them either. This suggests that the differences may not be attributable to gender itself, but rather to other factors related to gender such as gender role personality traits.

Gender role personality traits are individual's acceptance of stereotypic gender constructs as applying to oneself (Bem, 1974; Spence and Helmreich, 1980). The tendency to go along with what society expects of one's gender means one is following or subscribing to their gender scheme. Bem (1974) defined this as gender schematic. The tendency to not follow the societal expectations makes one gender aschematic (Bem, 1974, 1977). Thus a male whose scores on the Bem Sex-Role Inventory (BSRI) places him in the masculine category would be considered gender schematic while if his scores had placed him in the feminine category he would be considered gender aschematic. Gender role personality traits are not simply a measure of how masculine or feminine one

is. According to Bem (1974), everyone has traits that can be measured on both a masculine and a feminine scale. It is the strength of the measure on both of the scales that determines the degree to which one is gender schematic. This means if one scores high on the feminine scale and low on the masculine scale then one is considered to be *feminine*. Likewise if one scores low on the feminine scale and high on the masculine scale one is considered to be *masculine*. If one is high on both scales then they are considered to be *androgynous*. They are seeing the qualities of both masculinity and femininity as applying to themselves. If one scores low on both scales then one is considered *undifferentiated*. In this case one rejects both sets of qualities as applying to them. Although a majority of males score higher on masculinity and a larger percentage of females tend to score high on femininity, this does not have to be the case. Males can score in the feminine range and females can score in the masculine range. In addition, either gender can score in the androgynous or undifferentiated ranges. So biological sex and psycho-sociological gender do not necessarily follow gender role personality traits.

Spence and Helmreich (1978) thought gender encompassed far more than is measured by the BSRI. So she and her colleagues more narrowly defined gender role personality traits in terms of agency and connectedness. She, like Bem, constructed an instrument with the two scales but what Bem called masculine, Spence refers to as *instrumental* and what Bem called femininity, Spence calls *expressiveness*. The descriptors that Spence uses in the Personal Attributes Questionnaire (PAQ) that are instrumental (independent, active, superior) tend to focus on activity or agency while the expressive traits (emotional, gentle, kind) tend to focus on connectedness or relationship

to others. For Spence, like for Bem, gender role personality traits are comprised of the combination of scores on the instrumental and the expressive scales. Thus those scoring high on the instrumental scale but low on the expressiveness scale would be considered instrumental (masculine) while those with the reversed scores would be considered expressive (feminine). Also like Bem's BSRI, those scoring high on both scales would be considered androgynous and those scoring low on both scales to be undifferentiated. The key difference between Bem and Spence is that while Bem focuses on schematicity, the degree to which one identifies with stereotypic descriptors aligned with one's biological sex, Spence focuses on our tendency to focus on our independence or our connectedness with each other, or agency.

As Margolis and Fisher (2002) noted, females predominantly described their relationship to computers as one of using the technology to help others or enhance communication with others. In contrast, the males tended to describe their relationship to the computers as one of challenge (to gain superiority), and frequently worked alone (independently) and enjoyed making the computers do things faster with more power or more complexity (activity). This is the kind of behavior typically described when talking about computer playfulness. Similarly, males seem to be more playful with computers, using them in their leisure time and reporting immense enjoyment interacting with computers.

In summary, other studies have shown differing levels of engagement of computers between males and females. However, it is not known whether these differences may be more closely related to differences in gender role personality traits or

gender itself as most of the previous studies tended to focus on gender and not gender role personality traits. Previous studies showed no gender differences in CP when computer experience was controlled for. However, these studies only looked at gender and not gender role personality trait differences. The design of this study is to determine the extent to which gender role personality traits are related to computer playfulness.

Based upon prior studies and the Margolis interviews with students, one would expect female students to have more expressive qualities and have lower CP. Similarly, males should show more instrumental qualities and be higher on CP. Since 25% of the females in the Margolis, et al., (2000) study described instrumental qualities and 9% of the males described more expressive desires, we would thus expect that there would be some males who are expressive and lower on CP and some females to be instrumental and higher on CP. Finally, the previous studies only looked at CP in general. This study also looked at CP under 3 different conditions. In order to detect whether CP is a trait or a state, participants were also be surveyed on their CP levels at work, at school or when doing school work and when working on a computer at home.

Hypothesis 1: There will be significant differences in Computer Playfulness (CP) based upon setting.

Hypothesis 2: Those scoring higher in PAQ instrumentality will show a positive relationship to CP.

Hypothesis 3: Those scoring higher in PAQ expressiveness will also score lower in CP.

Hypothesis 4: Males will score higher than females on the instrumental scale and show a positive relationship to CP.

Hypothesis 5: Females will score higher than males on the expressive scale and show a negative relationship CP.

Hypothesis 6: Females that score high on the instrumental scale and show a positive relationship to CP.

Hypothesis 7: Males that score high on the expressive scale and show a negative relationship CP.

The focus of this study is to understand the relationship of the individual traits of gender role personality traits to computer playfulness as an investigation into human and computer interactions. The results of this study can help in furthering our understanding of how gender role personality traits and CP are related as well as the relationship between these factors and gender differences in computer use. This will also contribute to our understanding of how males and females characterize their interactions with computers. The implications for education and training could lead to more effective strategies to maximize the ways in which individuals use computers in training and educational efforts.

The limitations of this study include the correlational nature, which prevents us from establishing cause and effect relationships. Additionally, this study focuses on a limited range of computer activity. The study is based upon a self-report asking participants what they think about their feelings and behavior as opposed to direct

observation or electronic monitoring of computer behavior. In addition, the qualitative aspects of the study do not allow for generalization of findings but rather provide rich descriptions of how some individuals characterize their computer experiences and may point to further areas of inquiry. Future studies might further examine more specific relationships of human-computer interactions with gender role personality traits and other observational or behavioral assessments.

Chapter 2: Review of the Literature

As the use of computers has become more present in everyday life, the importance of their impact has also increased. According to the U.S. Bureau of Labor Statistics (Zoghi and Pabilonia, 2004) 61% of jobs require at least a basic use of a computer. Today most colleges expect that students will have basic computer skills in order to complete assignments and to do research (Furger, 1998). This would suggest that for most people computer skills are important to conduct activities in our daily lives. Those who become adept in this technology stand a chance at bettering the quality of their lives by making their studies and jobs easier. In addition, those who master the technology can take things a step further by becoming the creators and enhancers of the technology and thus the movers and shakers who chart the direction that the technology takes. Skills in this area can lead to jobs in the computer industry that are plentiful and high paying or to huge untapped entrepreneurial opportunities (Margolis and Fisher, 2002). However, for those who do not develop computer skills they may be, at best, relegated to the ranks of the end users and at worst even become computer phobic (Brosan and Davidson, 1994). Whether a person becomes a skilled user or not can be a function of computer experience but it can also be a function of underlying individual differences.

In looking at individual characteristics and how they relate to computer use, previous studies focused on constructs such as computer anxiety, attitude, and perceived computer efficacy**.** Computer anxiety can be defined as "…negative emotions and

cognitions evoked in actual or imaginary interaction with computer-based technology," (Bozionelos, 2001). It is an important construct because those high in computer anxiety are more likely to avoid computers and the general areas where computers are located; use excessive caution with computers; make negative remarks about computers; and attempt to cut short the necessary interactions with computers (Maurer & Simonson, 1984). Attitude toward computers has been the most widely studied of these constructs (Coffin and McIntyre, 1999). Attitude toward computers has been linked to predicting end user satisfaction with computers (Bailey & Person, 1983; Ives, Olson & Baroudi, 1983), frequency of computers use (Baroudi, Olson & Ives,1986; Lucas, 1978; Robey, 1979; Swanson, 1982), as well as outcomes of academic performance (Anderson & Hornby, 1996; Multon, Brown & Lent, 1991). Perceived self-efficacy addresses a person's belief in their ability to carry out a task to successful completion (Bandura and Adams, 1977). When applied to computers it is an especially important construct because it is a strong predictor of both attitude and anxiety (Compeau and Higgins, 1999). As perceived computer self-efficacy increases, the less anxious one is about computers and the more positive are the attitudes toward computers. In addition, those high in perceived computer self-efficacy are more likely to engage in actions related to computers and are more likely to persist when they run into difficulty (Gist, 1987). These 3 constructs have served as the focus of numerous studies on individual differences in human-computer interaction. Each will now be considered in a little more detail.

Anxiety

Raub (1981) in her dissertation advanced the study of computer anxiety through the development of the Attitudes Toward Computers Questionnaire. In developing the instrument she identified 3 independent factors that contribute to computer anxiety; Appreciation of Computer Technology, Computer Usage Anxiety, and the Computer's Negative Impact on Society. She administered the instrument to 220 undergraduates from various colleges in the Northeast. She discovered five variables that seem to be significant contributors to computer anxiety: gender, level of computer experience, college major, math anxiety (the experience of an increase in anxiety when confronted with situations that require mathematical calculations), and trait anxiety (the experience of an increase in anxiety across several situations) (Raub, 1981). She also looked at anxiety reduction through computer experience. She surveyed students enrolled in programming classes at the beginning and at the end of a semester. She found that programming courses did reduce computer usage anxiety; however, students in the courses did not show a reduction in fear of the computer's negative impact on society, nor did they show an increase in appreciation of computer technology (Raub, 1981). As part of her study, she interviewed students with high anxiety and students with low anxiety. The results of the interviews suggested that for highly anxious students, rather than enrolling them in programming courses, perhaps courses emphasizing computer usage and how computer applications relate to actual work situations would help better prepare them for the more abstract computer programming courses and reduce computer anxiety while increasing appreciation for the technology.

Howard and Smith (1986) investigated computer anxiety in business managers. They were looking at the prevalence of computer anxiety, its nature and whether computer anxiety was amenable to treatment. Earlier studies that looked at computer anxiety found connections with the general trait of anxiety (Raub, 1981), age (Weinberg, et al.,1981) and math anxiety (Fennema and Sherman,1976). Howard and Smith (1986) used parts of the instruments from these studies to construct a survey and administered it to 160 mostly Fortune 500 company managers. Through their survey, they found the incidence of computer anxiety to be relatively low. As might be expected with such a homogenous group, neither sex nor attitude was found to be related to computer anxiety however, there was a positive correlation between math anxiety and computer anxiety (.38, p=.001). Other variables such as locus of control, trait anxiety and cognitive style showed no significant relationships. Although no significant relationships were found between computer knowledge and computer anxiety, computer experience showed a negative relationship (-.48, p=.001) to computer anxiety. That is, as computer experience increased computer anxiety tended to decrease. This could be key because it hints that training on the concepts of computing might not help reduce anxiety as much as gaining actual computer experience. Finally, positive attitudes and positive expectations about the use of computers in the future were both found to be negatively related to computer anxiety. Much like computer experience, as positive attitudes and positive expectations about computers in the future increased, anxiety about using computers decreased. These results were similar to those of Raub (1981). Based upon these results, Howard and Smith (1986) assert that computer anxiety is likely to be treatable. This is

primarily due to the fact that math anxiety, which shows a high positive correlation to computer anxiety, has also been shown to be treatable. The findings that an increase in computer experience is correlated with lower computer anxiety suggests, that providing more experience working with computers is a viable approach to reducing computer anxiety.

In looking at factors underlying computer anxiety, Ayersman (1996) investigated the relationship between computer experience, learning styles and computer anxiety. Previous studies had shown that computer experience had reduced computer anxiety but had not looked at stylistic individual difference that might be mediating the process. So in an effort to explore these individual differences, Ayersman (1996) compared the anxiety reduction rates of students enrolled in 1-hour and 3-hour credit computer classes. He also compared the results to the student's learning styles as determined by the Kolb (1985) Learning Styles Inventory. This instrument asks participants how they best learn and then based upon their answers assigns them into one of four groups. A typical question would be something like

"I learn best when:

(a) I trust my hunches and feelings,

(b) I listen and watch carefully,

(c) I rely on logical thinking, and

(d) I work hard to get things done." (Ayersman, 1996)

The first group is the Assimilators. This group typically thinks by employing inductive reasoning and formulating theories. The second group, the Accommodators, tends to

trust their intuition, is more likely to take risks, and is highly adaptable to varying situations. The next group is referred to as the Divergers who are often able to see a situation from a variety of perspectives and are highly imaginative. The last group is known as the Convergers and those that fall into this group tend to rely on common sense and are very practical in their approach to problem solving (Kolb, 1985). Ayersman (1996) found that students in both learning situations reduced their computer anxiety as determined by pre and post course tests. There were no differences between the learning styles groups in the one-credit course. However, there were significant differences between the learning style groups in the 3-hour group. Specifically, the Convergers showed significantly lower levels of computer anxiety than the other three groups. What is interesting about this result is that the Convergers started out with the lowest level of anxiety to begin with. In similar manner, the Assimilators and Divergers, who both started out with higher levels of computer anxiety, end with higher levels when compared to the Convergers. This indicates that Convergers experienced significantly greater reduction in computer anxiety as a result of participating in a 3-hour computer course than the other groups in the 3-credit hour course did. Although the Assimilators and Divergers also showed a reduction in computer anxiety as a result of the course, they did so to a lesser degree. Thus, those with Convergent learning styles (practical, logical, common sense, etc…) would tend to benefit more from a three-hour course while other learning style types might be able to show equal reductions in anxiety whether they participate in a one or in a three-hour course. This study highlights the importance of

considering other underlying individual differences that might influence computer anxiety.

Another example of this would be Todman and Day's (2006) study of Scottish college students examining computer anxiety and psychological gender or gender role personality traits. They were investigating the relationship between biological sex, gender role personality traits (psychological gender) and computer anxiety. The difference between biological sex and psychological gender or gender role personality traits is that biological sex refers to the anatomical make up of one's body. Psychological gender or gender role personality traits refer to the degree that one accepts culturally stereotypic gender descriptors as applying to them. This is interpreted as the degree of one's masculinity or femininity. In addition to the degree that a biological male is considered to be masculine he is considered to be gender schematic. If the male were considered to be feminine, he would be considered to be gender aschematic. Likewise, the degree to which a biological female is considered to be feminine she is characterized as gender schematic and if she were considered to be masculine, she would be characterized as gender aschematic (Bem, 1981). To conduct their study, Todman and Day (2006) administered the short form of Newman and Clure's (1984) Computer Anxiety Scale (CAS) along with both the long and short versions of the Bem Sex Role Inventory (BSRI). The CAS asks participants to respond to positive and negative items concerning interaction with computers. Negative items are scored on a 5 point Likert scale with 1 being "almost never" and 5 being "almost always". Positive items are reverse scored. An example of a positive item would be "I would feel okay in classes

where I used a computer''. Whereas a negative item would be ''I get scared when I think about working with computers'' (Todman and Day, 2006).

The long version of the BSRI has 60 items, 20 of which gage masculine characteristics, 20 that gage feminine characteristics and 20 that are neutral. The short version uses half the number of items, eliminating descriptors that were thought to be negative on the femininity scale such as "gullible", "shy", "soft spoken", "childlike" and "feminine" as well as eliminating items on the masculine scale that showed lower correlation for the construct such as "ambitious", "competitive", "analytical", "athletic" and "masculine". It should be noted that although women tend to score higher on the feminine scale and males tend to score higher on the masculine scale this does not have to be the case. As noted above, there can be those who score higher in the opposite gender role personality trait and are thus considered gender aschematic. In addition the BSRI allows for those who score high on both scales to be considered androgynous thus more flexible in their gender role personality trait (both warm and assertive) while those who score low on both scales are considered to be undifferentiated, meaning that they do not see either set of descriptors as applying to themselves. Thus the BSRI yields the four categories of masculine, feminine, androgynous and undifferentiated as well as the classification of gender schematic and gender aschematic. The four categories are based upon the relationship between the two scales and the classification (schematic/aschematic) is based upon one's biological sex in relation to the categorization (masculine, feminine, androgynous or undifferentiated).

Todman and Day (2006) discovered that there was a relationship between gender role personality traits and computer anxiety based on the full version of the BSRI. Computer anxiety was negatively correlated with BSRI masculinity in females and approached but failed to reach a significant negative correlation for the males. This means that the higher the masculinity score was for females; the lower was their level of computer anxiety. There was also a positive relationship between BSRI femininity and computer anxiety in females. In this case, the higher the femininity score was for females, the higher was their computer anxiety. This relationship did not hold true for the males. When looking at the relationship between biological sex, psychological gender and computer anxiety, the researchers found that when biological sex was controlled for, the negative relationship between psychological gender and computer anxiety held. However, when biological sex was left in and psychological gender was controlled for, the negative relationship between biological sex and computer anxiety disappeared (Todman and Day, 2006). This signified that it was psychological gender (masculinity - femininity) that was responsible for the relationship and not biological sex (male –female). Similar results were reported with the short version of the BSRI. Again with this version, masculinity was negatively correlated with computer anxiety in females. However, this time BSRI masculinity was also found to be significantly negatively correlated with computer anxiety for the males as well. BSRI femininity was not significantly correlated with computer anxiety for either males or females with the shorter version. The authors speculate that this may be due to the removal of the negative descriptors from the feminine scale in the short version of the BSRI. When the psychological gender as a

whole was compared to computer anxiety the same relationship seen with the longer version held. That is to say, BSRI was still negatively correlated with CAS. This time, however, when psychological gender was controlled for, the biological sex still showed a significant relationship. However, when academic major was factored out, the relationship disappeared. This suggests that the relationship between psychological gender and computer anxiety is largely due to psychological gender and academic major (Science and Engineering vs. Arts and Social Science) and less to do with biological sex.

Finally, one last analysis conducted on the data concerned those who scored outside the first and second standard deviation on the CAS. Those outside the first deviation are considered to be mildly computer phobic. Those outside the second are considered severely computer phobic. In this study there were 17 females and 1 of the males that fell into the mildly computer phobic area. In addition, there were 5 males and 3 females in the severely computer phobic range. However, when looked at from a gender role personality trait perspective, 15 of the 17 mildly computer phobic females were in the feminine category and all of the females in the severely computer phobic range were feminine. For the males, 2 of the 5 in the severely computer phobic range were feminine and two were undifferentiated. There was one masculine male that scored in the severely computer phobic range. Interestingly, none of the people, male or female who were androgynous scored in either of the computer phobic ranges. This result highlights the positive relationship between femininity and those who score very high on the CAS. The Todman and Day (2006) study clearly shows that gender role personality traits more than biological sex can be important underlying factors affecting computer

anxiety. This might suggest that psychological gender or gender role personality traits could be a useful factor when investigating other individual differences that are related to computer usage.

Attitude

An early study of computer attitudes in school age children was conducted by Wilder, Mackie and Cooper (1985). They surveyed 1600 school children from kindergarten through the 12th grade. For younger children, directions for completing the survey were read to them and some had one-on-one assistance. Older children were asked to indicate whether they thought certain items and activities, including computers and video games, were more appropriate for boys, girls or neutral. They were also asked how much they liked computers and video games (as well as other activities such as writing, math and science). Their study showed that both boys and girls thought that computers were a male activity. Although both sexes ratings were near neutral, boys thought computers were a male activity more so than girls. As they went up in grades, the difference between boys and girls remained but the degree to which they believed computers were a male activity lessened (Wilder, et al., 1985). Boys and girls both reported liking computers but, once again, boys reported liking them more. In addition, as the grade level increased, the level of liking decreased. Similar findings occurred with responses to video games. Both boys and girls considered video games to be a male activity and boys considered it to be more so than girls. Both sexes reported liking video games with boys liking them more. As grade level went up, the degree of liking video games went down for both sexes (Wilder et al., 1985). As part of this research, Wilder, Mackie and Cooper (1985) conducted a second study of college freshman, their experience with computers and their attitudes towards computers. Contrary to the

findings with the school age children, they found that female freshman were as likely as male freshman to have a computer at home. They also seemed to have equal access to computers in school and were likely to have taken as many computer courses. However, there were differences in the type of courses taken. In this study female freshman were more likely to have taken introductory courses while male freshman were more likely to have taken a programming course. Even when females did have programming in their background, they were more likely to have taken PASCAL which is related to business and commerce while males were more likely to have taken FORTRAN which is a mathematical language more geared to science (Wilder et al., 1985). Unlike their elementary school counter parts, college students did not see computers as a sex-linked activity. However, both sexes did think that males used computers more and, like the K-12 students, males thought so to a greater degree than females did. Both sexes reported being comfortable with computers although females reported being less comfortable. In addition, when computer experience was looked at those who had taken a high school computer science course felt more comfortable with computers than their less experienced classmates. However, females who had taken a computer course reported feeling less comfortable than males who had not taken a computer course. So even though they had more experience, the freshman females felt less comfortable with computers. This seemed to indicate that experience alone does not necessarily make women feel more comfortable with the technology. It may well be possible that there is another factor at play that may affect women's sense of comfort with technology.

Ogletree and Williams (1990) conducted a study to investigate such a possibility. They looked at the relationship between biological sex and psychological sex typing (gender role personality traits) to computer attitude and aptitude among college students. They administered four instruments to obtain data on college students. They used modified versions of the BSRI (Bem, 1977), and the Computer Attitudes Scale (Dambrot, et al., 1985) as well as altered versions of the Self-efficacy Questionnaire (Miura, 1987) and the Computer Aptitude Test (Konvalina, Wileman and Stephens, 1983). The revisions mainly included reducing the response options from a 7-point Likert scale to a 5-point one. The first difference noted was that the women in this study were likely to report lower computer usage. The women used a computer less than 3 hours a week when they were at home while a higher percentage of men reported using the computer more than 3 hours a week (Ogletree and Williams , 1990). Like the Wilder, et al. (1985) study, this study found that males reported more positive attitudes towards computers and greater confidence in using them. Males also scored higher on the computer aptitude survey. Ogletree and Williams also found that for this group, computer experience was positively correlated with computer attitudes and self-efficacy. BSRI masculinity was also positively correlated with attitudes and expectations for success with computers. BSRI femininity was negatively associated with expectations for success with computers. When they controlled for computer experience and sex-typing (masculinity-femininity) they found that sex differences for computer aptitude and self efficacy disappeared. This means that the differences between biological sexes on these variables were actually due more to computer experience and gender role personality traits than to biological sex. Of

particular note is that when computer experience was controlled for, BSRI masculinity was still positively correlated with positive attitudes towards computers and expectations for success with computers. BSRI femininity was still negatively correlated with expectations for success with computers (Ogletree and Williams, 1990). Once again, we see femininity negatively affecting ones belief about a positive outcome when interacting with computers. The results here mirror those of Nickell et al. (1987) who used different measures of gender role personality traits and computer aptitude. Another model suggested by the authors that may fit the data is that of Turkle's (1984) hard and soft mastery styles. The hard style is one of detachment and objectification of the computer as a challenge to be conquered. The soft style is one of connectedness, interaction, and closeness. According to Turkle (1984) boys tended to exhibit the hard style while girls tend to exhibit the soft style. Ogletree and Williams (1990) suggest that based on this and earlier studies, masculinity and femininity might follow along the hard and soft styles of computer mastery, respectively. If this is true then gender role personality traits and computing styles may play a major role in not only how one uses the computer but ones attitude and confidence about using the computer.

Comber and Colley (1997; 2003) conducted studies of British school age children ages 11-12 and 15-16 in an attempt to discover the relationship between age, gender and experience on computer attitudes. The first study was done in 1997 and the second in 2003. The replicated study was conducted to see if time and changes in computers had an impact on computer attitudes. In the first study they looked at academic preferences as well as sex-role identity, computer use, experience and attitudes. They found that in

both age groups boys tended to report that they used computers more than once a week, used computers for at least a year and that they used computers to play games at a rate higher than girls did. Students in the lower age group reported using computers more than once a week more often than students in the older age group did (Comber and Colley, 1997). So like the Wilder, et al. (1985) study there was a reduction in frequency of computer use as students got older. A 2 x 2, sex by age analysis revealed that this drop was due entirely to the reduction in use by girls. That is to say that when looked across sex, younger boys and older boys used computers at approximately the same rates. However, as girls approached high school age, computer use significantly dropped off (Comber and Colley, 1997). As in previous studies, boys indicated that they liked computers and had greater confidence in using computers more than girls did. Boys were also more likely to indicate that computers were more suitable for males than for females while girls were more likely to disagree with this. The most interesting finding of this study was that when prior computer ownership was factored out, gender differences for liking computers disappeared (Comber and Colley, 1997). Because of this last finding, the study authors suggest two explanations for the reduction of computer use as girls became older. The first is that, if computers are seen as a masculine activity, maturing girls would tend to shy away from activities considered not to be feminine. However, the second, more compelling, reason could be that the younger girls are catching up to boys in computer use is due to the availability of more computers in the home. If this is the case then as computers become more available then we should have a marked reduction in sex differences in computer attitudes.

Colley and Comber (2003) replicated the study looking at the computer development from 1997 to 2002. As predicted, differences in frequency of computer use all but disappeared. However, differences in attitudes toward computers and differences in the type of computer use were maintained. In the second study we still find that boys report liking computers, and have a greater sense of comfort when using computers and using them to play games more than girls did. Boys were also more likely to use a computer over at a friend's house and that use was primarily for playing games. Older girls, but not younger ones, reported this far less often than boys (Colley and Comber 2003). When other types of use was looked at we find that younger boys were using computers more for music and games while younger girls were using computers more with CD ROMs and graphics. In the older group, boys' use of computers for music increased and girls' use of computer for games greatly decreased. For attitudes, boys were more confident about their skills in using computers while older girls were less confident. Boys also reported liking computers more. Another interesting and unexpected result was that boys engaged in less sex typing about computers. That is, they were less likely to see computers as more suitable for boys while girls' sex typing about computers use went up compared to the previous study. The result of the two studies seem to show that, while access to computers does result in equal use of the technology, differences in the type of use, attitudes about its use and confidence in its use still remain. This suggests that some other factors must be at the center of the sex differences in computing.

Perceived Self-efficacy

Perceived self-efficacy, as previously noted, relates to a person's belief in his/her ability to engage in and successfully complete tasks that will produce a specified outcome with in a given area of activity (Bandura, et, al, 1977). It is not the actual performance of the task that is of interest here, but the judgment about one's future performance. Gist (1987) in her review of self-efficacy noted that those higher in self-efficacy tend to choose activities related to the identified area of activity. They also then tend to persist longer and develop more coping strategies when faced with difficulties. According to Gist (1987) this then leads to greater mastery in the area of activity and thus increases the person's self-efficacy. Compeau and Higgins (1995) further refined this concept applied to the domain of computing and developed the Computer Self-efficacy Scale to measure self-efficacy with computers. Their instrument, along with asking if participants believed they could accomplish various computer tasks, also asked about measures that influence self-efficacy. These measures included encouragement by others; witnessing use by others; organizational support; outcome expectations; along with measures of affect, anxiety and use of computers. After a pilot study with 100 participants, they sent out 2000 questionnaires to Canadian business periodical subscribers. Of those chosen, 88% had college degrees, 40% had graduate degrees (mainly MBA's) and 80% reported using a computer for work. Their final sample size included 83% males with an average age of 41. After some adjustments to the measures, results of the study showed that the Computer Self-Efficacy Scale was internally consistent and could serve as a viable tool for measuring self-efficacy in the domain of computers. However, due to the lack of

female participants, the limited age range, and socioeconomic level of the participants, it might be difficult to generalize these results.

More recent research in this area has shown that self-efficacy might not be a valid measure of actual ability. Recall that Wilder, et al., (1985) showed that college age females with computer programming experience reported being less comfortable with computers than college aged males with no computer experience. Now twenty-one years later, Hargittai and Shafer (2006) have shown that, even when Internet search skills are comparable, women tend to downgrade their abilities. In their study of a random sampling of 100 Internet users from Mercer County, New Jersey, they assessed participants on 8 different Internet information search tasks. They found no statistically significant difference between males and females on the completion of the tasks. However, when participants were asked to rate their skills on the tasks, men were more likely than women to rate themselves as highly skilled. In fact, no woman in the study rated herself as "expert" while no man rated himself as "not at all skilled". This indicates that even when skills are comparable, an individual's assessment might not be accurate. This tendency seems to fall along gender lines and highlights another instance where computer experience does not show a positive relationship to an affective construct. We have seen how experience does not automatically reduce anxiety and how experience does not necessarily improve attitude towards computers. Now we see that experience does not necessarily improve perceived self-efficacy with computers especially among women. Maybe it is time to look at what other factors might be affecting women's anxiety, attitudes, and self-efficacy with computers.

Computer Playfulness

A less well-known construct that also looks at human-computer interactions, *microcomputer playfulness* or *computer playfulness* (CP), developed by Webster and Martocchio (1992), may also be useful in understanding individual differences and computer use. Computer playfulness is an individual characteristic that "… describes the individual's tendency to interact spontaneously, inventively, and imaginatively when interacting with microcomputers …" (Webster and Martocchio, 1992). It is a situation-specific form of cognitive playfulness involving interaction with a personal/micro computer. Based on the Cognitive Playfulness Scale, Lieberman (1977) developed for exploring playfulness in children. Webster (1989) adapted and developed the Adult Cognitive Spontaneity Scale (ACS). After pilot testing the scale with 90 undergraduate Management Information Systems students, the scale was shortened and adjusted to become the Computer Playfulness Scale (CPS). In developing the construct, Webster and Martocchio conducted 5 independent studies with over 400 participants. The 5 studies consisted of different population groups ranging from undergraduate students enrolled in a large private Northeastern university Management Information Systems (MIS) class to MBA students at a large public Northeastern university. The study also included accounting students at a large Northeastern university trained in Lotus 1-2-3 and university employees enrolled in a word processing computer training course at a large Midwestern university. All participants completed computer playfulness questionnaires

while those enrolled in training courses took pre and post-test assessments of their software knowledge as well as completing pre and post training questionnaires on affect towards the training. Across the 5 studies, the CPS showed consistent internal reliability ranging from .86 to .90. The studies also showed a positive relationship between computer playfulness and positive computer attitude as well as a negative relationship between computer anxiety and computer playfulness. Computer competence, determined by a combination of experience, scores on a baseline quiz, and perceived computer efficacy, was also highly correlated with computer playfulness. Following Schmitt's (1971) model for discriminant validity, Webster and Martocchio compared operational measures, conducted combined reliability analysis, analyzed item correlations and compared scale reliabilities with interscale correlations for computer playfulness, computer anxiety and computer attitude. Their findings confirm that computer playfulness shared characteristics with, but is different from the constructs of computer self-efficacy, computer attitudes and computer competency. Computer playfulness also has a negative relationship with computer anxiety. The negative relationship between computer playfulness and anxiety is so strong that it has been suggested that creating conditions that induce playfulness might actually reduce computer anxiety (Hackbarth, et al., 2003).

In their study of computer experience and perceived ease of use, Hackbarth and his colleagues (2003) looked at the relationship between computer playfulness and computer anxiety as it related to computer experience. The question they wanted to address was how computer playfulness and computer anxiety mediate computer

experience and thus affect the perceived ease of use of computer technology. They found that both computer anxiety and computer playfulness mediated the relationship between experience and perceived ease of use. This study only focused on the use of one computer program (Microsoft Excel) and not computer use in general but they did find that anxiety was a more significant mediator than was computer playfulness. However, due to the inverse relationship between anxiety and computer playfulness, the authors suggest creating training that is more playful in nature as an anxiety reducing tactic to increase perceived ease of use.

Computer playfulness, along with being different from but related to computer self-efficacy, computer attitudes and computer competency as well as being a mediator between experience and perceived ease of use, shows to be a better predictor of greater involvement with computers, positive affect, greater satisfaction and increased learning with computers than either computer attitudes or computer anxiety (Webster and Martocchio, 1992). In their initial study Webster and Martocchio found that those who were high in CP also reported positive affect, more satisfaction with computer interaction and scored higher on tests of learning after training. Thus CP showed high predictive value for affect, satisfaction and learning as well as for involvement with computers among the employees in the study. The results also showed that CP had greater predictive value than either computer attitudes or computer anxiety for affect, satisfaction and learning anxiety (Webster and Martocchio, 1992).

A similar example was shown when Martocchio and Webster (1992) examined the relationship of computer playfulness to feedback and training outcomes. In this study

of 68 university clerical and administrative staff, Martocchio and Webster were looking at the effect of feedback and pre-training cognitive playfulness on training outcomes, positive mood and software efficacy. This study is important in light of the current research because they used the Computer Playfulness Scale as the measure to determine pre-training cognitive playfulness. Thus, what they referred to, as cognitive playfulness was the same measure as computer playfulness. Specifically, this study looked at how negative feedback, positive feedback and computer or cognitive playfulness was related to performance on post training quizzes as well as measures of perceived software efficacy and positive affect. They also included measures of computer anxiety, computer experience and motivation to learn to determine the incremental validity of cognitive playfulness over these and the other items. Their analysis showed that cognitive playfulness demonstrated incremental validity for affect (mood) and learning over the other constructs sampled (Martocchio and Webster, 1992). Their results further showed that positive feedback and higher cognitive playfulness were related to higher post training test performance. They further showed an interactive effect for positive feedback and cognitive playfulness. The relationship that they discovered was that those lower in cognitive playfulness showed greater improvement in scores than those higher in cognitive playfulness. Put simply, the lower participants were in cognitive playfulness the more they benefited from positive feedback. Finally, they found that positive feedback was related to satisfaction with feedback and satisfaction with the trainer but not with positive mood. Cognitive playfulness however, was related to positive mood and satisfaction with feedback but not with satisfaction with the trainer. The key finding

in this study is that those lower in cognitive or computer playfulness showed greater enhanced performance when they received positive feedback than did those higher in cognitive playfulness. Those higher on cognitive playfulness showed greater post training performance and more positive affect about the training than those lower in cognitive playfulness. So, while those lower in cognitive playfulness improved their post training scores more from positive feedback, those high in cognitive playfulness needed less positive feedback and still scored higher on post training tests and reported liking the training more.

Potosky (2002) also found post-training effects for computer playfulness. In her study she looked at how CP was related to task-specific self-efficacy and performance during training. This study looked at how the participation of 56 new employees of a midsized software development firm in the company's orientation and software training program was affected by pre-training efficacy, task specific and prior knowledge as well as how post-training efficacy was mediated by computer playfulness and performance during training. Potosky (2002) found that prior computer knowledge and performance during training were related to post training efficacy. However, when they controlled for pre-training efficacy the effect disappeared. This suggested that those already high in computer efficacy with prior computer knowledge and satisfactory performance during training will have high post training efficacy but this effect is largely attributable to their pre training efficacy. This study indicated that there is an interactive effect between computer playfulness and performance during training. That is, those high in computer playfulness and who did well during training had higher post training efficacy. The fact

that those lower in computer playfulness had lower post-training efficacy even when they performed well during training is what is most significant for the current study. This means that even though they performed well during training, those lower in CP had doubts about their skills after the conclusion of the training. This might seem counter intuitive. Based upon behavioral models one might expect the positive experience of the training would translate into greater confidence about one's skills but this was not the case for those low in computer playfulness. This may be due to the fact that the training involved highly skilled workers or due to the fact that the training and task specific self-efficacy were related to computer programming.

Since many of the previously mentioned studies dealt with specific software applications one might question whether CP is a state or a trait. In order to highlight the distinction, Webster and Martocchio (1992) define a trait as a stable personal characteristic that varies little from situation to situation. Whereas a state is a cognitive or affective experience that lasts for a short time, fluctuates over time and is heavily influenced by the situation. Computer playfulness can be considered both as a state and as a trait (Woszczynski, et al., 2000). As a state, CP is often linked to Csikszentmihalyi's (1990) concept of flow. This is the state of optimal experience when one is performing at an increased level moving toward his/her desired goal.

> "Flow is a multi-dimensional construct representing the extent to which: (1) the individual perceives a sense of control over the interaction with the technology; (2) the individual perceives that his or her attention is focused on the interaction; and (3) the individual finds the interaction cognitively enjoyable…" (Webester and Martocchio, 1995, p.763)

People in this state often talk about the awareness of time passing being gone and total engagement in the process (Csikszentmihalyi's, 1990). However, due to its nature, this state cannot endure. Whether for a few minutes or several hours, eventually the individual comes out of the flow state into an acute awareness of the passage of time and awareness of the immediate surroundings. While certainly this can describe one form of CP that one might feel when debugging a program or designing a web page, as a trait, CP addresses a longer lasting propensity to interact imaginatively, spontaneously and inventively on a regular basis with a personal computer (Webster and Martocchio, 1992). When considering CP as a trait it is not the specific computer activity such as programming or web page development that one finds playful but rather the interaction with the computer itself. So whether managing email, writing a memo, entering data into a spreadsheet or programming a database, the more playful individual is likely to find the experience to be engaging and enjoyable. Woszyczynski (2000) examined the relationship between the trait of CP and the state of CP (flow) in trying to construct a comprehensive model of playfulness. Although she did not find a direct connection between CP (trait) and flow (state) she did find that both the trait and state of CP contribute to playful behaviors when working with a computer. That is to say that whether one is in a state of playfulness due to the current activity or one is usually playful when interacting with a computer, the spontaneous, inventive and exploratory behaviors will be similar. This suggests that either the state or the trait of computer playfulness can lead to playful interactions with a computer. For the current study it is CP as a trait that is of interest.

Based upon the previously discussed studies it might seem that consequences of CP are all positive. However, there are some potential downsides to being high in computer playfulness. For example, the construct developers Martocchio and Webseter (1992) noted that those high in CP might tend to take longer to complete a project. Due to the exploratory nature of CP, someone high in playfulness might be tempted to explore the possibilities of a program rather than focus on finishing the task at hand. Also, due to the intrinsic motivational nature, those high in playfulness might seek out opportunities to interact with a computer when a less technological approach might better suit the task. For example, one might need to find the meaning of a word. Even with a printed dictionary on the desk, someone high in CP might prefer to seek out the meaning of the word using the computer. Granted, an online search could come back with more definitions and provide access to several sources including the Thesaurus but, if only a simple definition was needed, then the expanded investment of time may have been unnecessary for the task. In addition, because of the enjoyment received from the interaction, those high in CP might also look for opportunities to do tasks other than assigned work for either class or on the job. Thus the risk exists for them to engage in more unnecessary or inappropriate use of the technology. Although these potential negatives may exist, to date, not much research has been done to investigate this aspect. Howell (2000), did look at CP and web based training. In her study on learner control in web based training (WBT) she investigated how the individual differences of CP, mastery orientation, perceived web efficacy and attitude toward WBT were related to the selection of content choices, activity level, emotional engagement and attentional focus

under high and low learner control conditions. In this study design, participants completed a web based training activity that was either sequential (low learner control) or allowed for user selection of training modules (high learner control). Participants were also able to choose to access help modules that provided more background and information (content choices). The only significant finding yielded in this study was the relationship between CP and content choice. Counter to the hypothesized expectation, those higher in CP actually made fewer content choices than those lower in CP (Howell, 2000). That is to say, when given the opportunity to explore, those higher in CP actually did less exploring and tended to focus more tightly on the learning objectives. This suggests that they were able to focus more on the task at hand and were not distracted by opportunities to explore the menu options. In this study, those high in CP tended to be more engaged in the task and completed it sooner. This one study demonstrates that under certain conditions one of the potential negatives of CP did not manifest itself.

This should not however, lead one to think that there are no potentially negative aspects associated with those high in CP. As previously stated for the most part being high in CP seems to be beneficial. Lower computer anxiety, greater engagement, intrinsic motivation, and self-directed learning are all positive qualities to have in a computer user. Anderson and Hornby (1996) went as far to suggest that computer playfulness might be, "… one of the most important aspects of human-computer interaction."

If computer playfulness is to be an important measure of human-computer interactions then we need to be careful not to let it become a dividing measure

between those who are considered to be on the inside of the computer development community and those on the outside. Those computer science majors who spend hours working on computers and even make use of them in their leisure time are the ones who go on to careers in the field while many of those who do not exhibit those type of behaviors tend to change their majors and opt out for different careers (Margolis, et al., 2000). Women who get accepted into some of the most competitive computer science and computer engineering schools in the U.S. frequently change majors after the first or second year. They often cite a feeling that they do not belong in the department because they do not have the same deep fascination and focus on computers as many of their male counter parts. The women do not use the computers in their leisure time nor do they play games to the extent that some of the males do. It is this comparison to these highly engaged males that women cite as a contributing factor in their decision to change their majors. This is despite the fact that at the time they decided to change majors, the women were earning good grades in their courses (Margolis, et al., 2000).

One example is that of Carnegie Mellon University, one of the nation's top computer science schools, where women tend to make up less than 10 percent of the incoming computer science/computer engineering majors. By their sophomore year, women are transferring out of the programs at twice the rate of men (Margolis and Fisher, 2002). Many of these students cite feeling like they do not belong even though they are making satisfactory grades. Men who spend

most of their waking hours interacting with computers and even forgoing sleep to do so, points to an unhealthy attitude that could be the result of an overly developed sense of computer playfulness. Whereas both men and women cite enjoyment of computers as their primary reason for majoring in computer science, 70% of men list this as their sole reason for choosing the major. Most of the women listed several other reasons including using computers to help society in other areas such as medicine. The women seem to want to connect computing to other parts of their lives while the men seem to want to just focus on computing itself. As one male student Margolis (2002) interviewed put it:

> "Music as an art form is similar to programming as an art form; it's something you can sit down and within a day you can be doing something which has an essence of beauty to it…That process I still find very interesting—how to say what you want to say—so that code in itself is what is interesting, even more than the actual effect that it has." (Margolis and Fisher, 2002, p 55).

However, it is not only the women who are affected. At least 30% of the men listed other reasons than the enjoyment of computers for majoring in the field. Many male students resist the "geek/hacker" ideal when it comes to computing. They, like the women, strive for more of a balance or focus on the practical applications of computers. This suggests that maybe this deep engagement with computers is not only related to gender but to other factors such as gender role personality traits.

Gender Differences

Almost since the beginning of the personal or computer age there have been concerns about gender differences in computing. In 1985 the journal *Sex Roles* (Lockheed, 1985) devoted an entire issue to the topic. Many of these studies found differences between males and females in relation to computers. Most of the differences favored the males. For example, Felter (1985) studied students in California public schools. He specifically focused on 6th and 12th grade students. To look for differences he tested and surveyed the students. After testing over 1200 12th graders and over 7000 6th graders, he found that boys out performed girls on almost every measure. The testing showed that 12th grade boys outperformed girls in areas including computer literacy, problem solving, computer science, software and hardware. For 6th grade students the results were the same with the exception of problem solving where there were no significant differences. In addition, boys in both groups had more positive attitudes toward computers than did the girls. Finally, boys showed greater exposure to computers both at school and at home. Boys were also more likely to play computer games and to use a computer at a friend's house. Girls did use computers at school on par with boys when there was a class assignment. Girls were also more likely to report no experience with computers than were boys. Felter (1985) speculates that less exposure is the cause for the differences. Also, if we take into account that at the time of the study many schools did not have ample access to computers for their students and the personal computer

market was still very much in its infancy, only the early adopters and those eager about the new technology had a great amount of exposure to computers.

Another example of differences between males' and females' access to computers was revealed by Hess and Miura (1985). They looked at enrollment in computer classes and computer camps. Through demographic surveys completed by directors of summer camp that offered computer training, they found that among more than 5000 children enrolled, that boys were represented three times more often than girls. They also found that the more expensive the camp, the older the age group and the higher level of training offered, the less likely girls were to be found. One camp director pointed to one reason for this disparity being linked to parental encouragement. He reported that, “Mothers bring their sons to the classes. Girls have to beg to enroll…” (Hess and Miura, 1985). Other explanations include the relationship of computing to mathematics. At the time math teachers taught most of the computer courses. The authors speculate that math phobia may have transferred to computers. Probably the biggest influence on the difference might be computer games. Computer games either on PC’s or in arcades were the point of entry to computers for many boys. The computer games had low appeal for many girls. In a previous study, Miura and Hess (1984) surveyed students about computer games. Through the random sampling of 75 video game titles the students saw 37% of video games as being written for boys and only 5% as being written for girls. The 37% included the most popular titles. This suggests various inputs that could

influence gender differences in computers ranging from parental encouragement to the computer industry and game design.

One more difference pointed out in the Sex Roles (1985) journal was that of the cognitive engagement process. Mandinach and Corno (1985) looked at the cognitive engagement process and problem solving. Their study looked at how students of different levels of ability performed in a problem solving computer game and what kind of cognitive engagement processes they employed. For this study they assumed that students learned through the self-regulated, conscious application of information acquisition and transformation process that supports retention and reasoning (Mandinach and Corno, 1985). They identified 4 types of engagement processing; active, resource management, recipient learning, and task management. Active engagement involves alertness, selective perception, and planning. At this level the learner is highly involved, cognitively, and self regulating in the learning process. Although helpful in learning it is not necessarily the type of engagement for all learning tasks. The authors expect learners to shift between forms of engagement depending upon the structure of the learning task (Mandinach and Corno, 1985). The second form of engagement involves gaining assistance from peers, the teacher or even from the instruction itself. Considered to be less self-regulated learning, the authors call this form, resource management. This type of engagement is helpful in situations such as group learning but not as helpful in individualized instruction. The third type of engagement is called recipient

learning. In this form, the learning from instruction is highly structured and the learner more passive in transforming the knowledge. The learner is not required to invest as much cognitive effort. Situations such as programmed learning and drill and practice are of this type. Mandinach and Corno (1985) suggest that this type of learning does not lead to long-term cognitive growth as much as the other forms of engagement. The fourth form of engagement is task focused. In this form the student exhibits efforts to transform the information into long-term retention but is not as alert as in active engagement. The learner focuses on the task itself and fails to make use of outside information such as instructor cues or other information for help.

This model of engagement was used to assess which type of engagement students would use in a problem solving computer game. Students from the San Francisco area volunteered for this study. The 48 students were divided into groups and matched based on scores from ability assessments. Students in each group went through 12 trials of the problem solving the game with minimal assistance. Along with game performance, interviews, response patterns and error rates were collected and analyzed. Evidence of transfer was gathered by assessment in a follow up session. The results show that high ability students out-performed low ability students and that males out-performed females in the problem solving game. When the type of engagement was looked at, both males and those in the high ability groups used the active, self-regulating type of engagement. More than twice as many females as males used the passive form

of engagement; seeking input from the teacher or the help menus. Students who used active engagement were more successful in the problem solving game. In addition, males were more successful than females and high ability students were more successful than low ability students. Interestingly, differences in performance were not tied to interest in the game or interest in computers in general. The authors note that another difference is that of engagement form selection. Among females there was a tendency to stick with one type of engagement, whereas males tended to shift their type of engagement as they became more familiar with the game strategy. One of the unexpected phenomena was the tendency of high performing females to continue to ask for assistance even when their play indicated an understanding of the game while males shifted from active to task-focused engagement (using less input from outside sources) as their game play continued. While there were many potential problems with this study, such as low number of participants and the type of problem solving game used (hunt and kill), interviews with participants and comparison to other research at the time did not show these to be issues of major concern. The value of this study is to suggest that there may be different cognitive strategies employed by males and females, even high ability, high performing males and females, when approaching problem-solving tasks. The key is to see if this pattern is replicated in other settings and other conditions.

These studies took place in the early days of personal computing when access to computers seemed to be the major issue. The question arises then as to what happens as access increases and use becomes more comparable? Whitley (1997) performed a meta-analysis of gender and computing studies from the US and Canada. This analysis included 82 studies that accounted for over 40,000 participants. The studies were analyzed for gender differences on seven dimensions. The dimensions studies included affect, belief, self-efficacy, and sex-role stereotype as well as combinations of these measures. He also looked at prior computer experience and current computer behavior. For this analysis, affect included measures such as anxiety, fear, and liking of computers. Belief addressed agreement with positive or negative statements about computers and their perceived effects on people and society. Sex-role stereotype focused on agreement with the notion that computer use was more appropriate for males than for females. Prior experience looked at hours of use and courses taken before participating in the research while current behavior addressed present accounts of the same measures (Whitley, 1997). Since all of the studies analyzed found significant differences, Whitley was investigating the effect size of the differences. Whitley (1997) found that the mean effect-sizes for difference were not statistically significant or small for most groups on most of the measures. Medium effect-sizes were found for high school students for affect (anxiety, fear and liking) and self-efficacy. Adults also showed medium effect sizes on the self-efficacy measure. The measure that showed the greatest

difference in effect sizes was sex role stereotype. College and elementary students showed medium effect size differences while high school students showed large effect size differences. Elementary school students also showed medium effect size difference on current computer use. This meta analysis seems to illustrate that, overall, most sex differences in the area of computers are small. The ones that need to be of concern are self-efficacy and sex-role stereotype. According to this meta-analysis more males tend to see computers as a male-oriented domain and see themselves as more capable with them than do females. This is despite the fact that computer experience shows little difference between males and females. The acceptance of stereotypic beliefs may be a key component in developing self-efficacy with computers.

More recent surveys and studies tend to bear this out. Dholakia, Dholakia and Kshetri (2003) showed that, men and women in the US and Canada use the Internet very differently. Males still tend to use the Internet more often, stay on longer and visit more pages than women. While both men and women reported using email, men reported using it at work and at home more often than women did. Women reported mainly using email at work. Men also reported using the Internet for shopping more than women did. Men also used it for shopping both at home and at work. In comparing shopping sites, men used eBay more and women used Amazon.com more (Dholakia, et al., 2003). Men also tended to spend $500 more online than women. Men's buying patterns was one of relying on the online purchases while women tended to shop online but purchase offline.

When they did purchase online, men tended to purchase technology, while women tended to purchase apparel (Dholakia, et al., 2003). Other differences include men's preference for search engines and sports sites while women spent more of their online time on news and entertainment sites. When asked, men tended to prefer to use the Internet to pursue hobbies while women preferred to communicate with friends and family (Dholakia, et al., 2003). In comparing results with those from other nations, the authors sum up the source of the differences to be attributable to attitude toward technology, attitude toward risk and gender role personality traits. It should be noted that although the differences were significant, in most cases the effect size was small. The authors point out that the Internet is a young technology and as it develops many of the differences will change while others will only change as the culture at large changes.

This latter cultural change might actually be one that will take longer. According to a Women in Technology report (2001), based upon the fall 2000 survey by the Higher Education Research Institute at UCLA, among college freshman women use computers as much as men but are only half as likely to rate their skills as superior. Men were 5 times more likely to pursue a career in computer programming while women were still more likely to major in nursing, elementary education and social sciences. This reflects women's overall altruistic goals of helping others, influencing social values and participating in community action while the men tended to focus on

individualistic goals of being successful in business or influencing the political structure (Women in Technology, 2001).

Another example of this can be seen in the rise of the social networking sites on the Internet. Even though males and females both use these sites, they use them for different purposes. A social networking site is one where a user can post personal profiles with information about themselves and their preferences for the purpose of creating a network of people who have similar interest (Lenhart and Madden, 2007). According to a study conducted under the Pew Internet and American Life Project (Lenhart and Madden, 2007) the use of these networks have grown exponentially over the past 5 years to a point where there are tens of millions of users. Facebook and Myspace are two of the largest social networks. According to the study approximately half of teenagers from 12-17 years old have created a profile on one of these sites. Older girls (15-17) are more likely to use these sites than are males of the same age group. The study showed that 70% of the girls in this group had created a profile compared to 54% of the males (Lenhart and Madden, 2007). According to the responses to this survey, 91% of the teens use these sites to keep track of friends they see regularly while 82% use them to keep in touch with friends they rarely see. While the girls tend to network with their current friends boys were more likely to try to meet new friends. Although a relatively low number indicated that they use the sites to flirt (17%), boys were twice as likely as girls were to admit to doing so. It should be noted that while girls did not admit to using their profile to flirt, one of the biggest criticisms of Myspace is the sexually suggestive pictures many girls post of themselves as well as the provocative screen

names that many of them use. Girls were also more likely to post a message on a friend's publicly viewable bulletin board while boys were more likely to make use of the networking functions of finding new friends with similar interest. In broad terms, girls are using this technology more than boys and are using it more as a communications medium for current existing friends. Boys are using the sites to make new friends, flirt with strangers and meet up with like-minded groups.

In looking at gender and technology, Cooper and Weaver (2003) noted that while males and females differed in their computing styles, anxiety levels, perceived self efficacy and participation in computer courses, this did not fall along strict gender lines. They reference Brosnan and Davidson (1994) who showed that gender role personality traits (masculinity/femininity) was a greater influence on many of these factors than actual biological sex. Thus, it may be the social construction of gender and the individual acceptance of the construction that is key to understanding gender differences in computing.

Gender Role Personality Traits

The early studies focused on understanding gender differences tended to focus on differences between the sexes. To be clear, when we refer to *sex* we are talking about the biological difference between males and females. *Gender* refers to the psychological and social constructions assigned to one based upon his/her sex. *Gender role personality traits* refer the degree to which the individual

accepts the societal role as applying to him or herself. Gender role personality traits refer to one's degree of masculinity or femininity.

Early gender role research included that of Terman and Miles (1936). They characterized masculinity and femininity as opposite traits. That is, what is feminine is not masculine and what is masculine is not feminine. They developed an instrument to measure masculinity and femininity called the Attitude Interest Analysis Test (AIST). This instrument used a variety of assessment means including word associations, inkblot associations, and interest items (Stets and Burke, 2000). One part of the instrument characterized people as feminine for liking "nursing," "babies" and "charades." Not liking the same items earned masculine points. Similarly, people earned masculinity points for liking "people with loud voices" and "hunting," and earned femininity points for not liking the same items. This type of assessment, used for over 30 years established a model of masculinity and femininity as opposite, zero sum traits. The M-F model makes the masculine and feminine domains distinct opposites with no overlap. Quite clearly, according to this model, that which is feminine is by definition not masculine and vice versa. Some of the major criticisms of this model are that it tends to exaggerate gender differences. It also fails to allow for a continuum or any overlap. Finally, many of the descriptors of femininity were negative (Morawski, 1987). Feminine traits were often similar to those found in children or were passive in nature. Thus, under this model it is unfeminine to be assertive even in the face of adversity.

Sandra Bem (1974) developed a different model of gender role that allowed for greater variability. Instead of suggesting that feminine and masculine traits are opposite she suggested that femininity and masculinity are parallel traits. She further suggested that both men and women had a set of masculine traits and a set of feminine traits. She added the concept that a combination of these traits could exist within the individual. She called this trait *androgyny*. Like the Greek roots of this word might suggest, androgyny is the combination of high levels of both masculine and feminine traits. To assess gender role she developed the Bem Sex-Role Inventory (BSRI). This instrument comprised of 60 items (20 masculine, 20 feminine and 20 distracters) that asks individuals to what degree do they agree that the descriptors apply to them. Individuals reply with a 7-point scale with 7 being “this is like me” and 1 being “this is not like me”. Because there are two scales all individuals who take the assessment produce a masculine and a feminine score. It is the relationship between the scores that results in the final classification. Those who score high on the masculine scale but low on the feminine scale are classified as masculine. Those who score high on the feminine scale but low on the masculine scale are considered to be feminine. Those who score high on both scales are considered to be androgynous and those who score low on both scales are considered to be undifferentiated (Bem, 1977). Some of the criticisms of the BSRI are that some of the terms on the feminine scale are negative (flatterable, gullible) while none of the masculine terms are. In addition the BSRI actually uses the terms

"masculine" and "feminine" in the scale. To counteract these and other questions, Spence, et al., (1978) devised a different instrument called the Personal Attributes Questionnaire (PAQ). The PAQ had the same scales as the BSRI but only uses 8 items per scale and respondents rate the items more as polar opposites. Thus individuals rate themselves a being either independent or not very independent with 5 rating points in between. Because Spence, saw gender as having many facets she considered the PAQ to actually be addressing the degree to which one operates in an expressive (feminine) or instrumental (masculine) manner. Like the BSRI, scoring high in expressiveness and low on instrumentality characterize one as being expressive while scoring in the reverse manner place one in the instrumental category. She also allowed for androgyny (high on both scales) and undifferentiated (low on both scales). It is due to the traits used in the PAQ (independent, competitive, feels superior) that it was chosen for this study. The traits that coincide with PAQ instrumentality seem like they would support the traits that go with computer playfulness. The previously described traits of those high in CP as well as the descriptions of males in the previous studies indicates that there may be a relationship between CP and gender role personality traits. However, to date this has not been tested.

When looking at individual differences and human-computer interaction, it appears that certain specific individual differences influence how humans relate to computers. We find that those with convergent (logical, practical, common sense, etc.) learning styles are less anxious about computers than those with

other learning styles (Ayersman, 1996). Further, we find that both males and females who subscribe to a masculine gender role personality traits tend to be less anxious about computers than those with a feminine gender (Todman and Day, 2006). This is related to a lower expectation for success with computers for those higher in femininity and a greater expectation for success for those who are higher in masculinity (Ogletree and Williams, 1990). Once again biological sex was not the determining factor but rather the acceptance of socially prescribed gender role personality traits.

Human biological sex may not totally be discounted based upon studies showing that males, in general, tend to show more confidence with computers than females (Hargittai and Shafer, 2006). This occurs even when experience is in taken into account. Although differences, confidence, anxiety, attitudes towards computer still seem to persist, the difference in the measures seems to be small (Whitely, 1997). However, even though the differences may be small their impact can be large. Differences in confidence about their computing abilities have led many promising computer science and computer engineering majors to change their majors (Margolis, 2000). The reason for concern is that most of those who are dropping out of the computer programs are women. Women are already under represented in these disciplines. The lack of confidence cited is often due to comparison with classmates who tend to exhibit a high degree of computer interaction, even in their spare time. These students, mostly men tend to exhibit behaviors that indicate a high level of computer playfulness. Likewise, with the recent advent of social networking Internet sites, there

seems to be a difference in the types of use between males and females that also seem to fall into gender role personality trait categories. The girls tend to use the sites in an expressive manner or to deepen connections with those already in their lives. Boys tend to use the site in a more instrumental manner or to achieve goals of making new connections, meeting up with groups and possibly start new romances. Computer playfulness has been shown to be similar to but distinct from computer attitudes and perceived self-efficacy with computers. It has also shown a negative relationship to computer anxiety. To date, computer playfulness has not been compared to gender role personality traits.

The goal of this study was to determine if there is a relationship between gender role personality traits and computer playfulness. In addition, this study was designed to compare CP under four different conditions; at work, at school and at home as well as CP in general. This was done to help differentiate the trait of CP from the state of CP. The researcher felt that if a relationship between computer playfulness and gender role personality traits could be established it would add to the literature on gender role personality trait differences in computing as well as add to the research on computer playfulness. Further, since research has shown that those at varying levels of CP react differently to training, it may lead to new ways of approaching teaching and training with computers. Also if differences were found between CP in different settings or contexts, then it would be clear that we are looking more at the state rather than the trait of CP. Since obtaining gender role personality trait orientation and level of computer playfulness can be done fairly quickly, if trainers and teachers assessed their students prior to

learning then they could tailor lessons for maximum benefit. Also, based upon results, a model for looking at computer-human interaction and linking gender role personality traits to how people use and perceive their use of computers could be developed as an approach for further research.

In investigating CP as a state rather than a trait there is a possibility to find significant differences in CP based upon setting.

Hypothesis 1: We expect to find differences between CP based upon setting.

Based upon the descriptors used to determine PAQ instrumentality, it would seem that computer playfulness would be an instrumental trait. In addition, many of the behaviors exhibited by women in the studies seem to not favor computer playfulness and are more in line with PAQ expressiveness (seeking assistance, down-playing ability, more focus on human interaction).

Hypothesis 2: Those scoring higher in PAQ instrumentality will show a positive relationship to CP.

Hypothesis 3: Those scoring higher in PAQ expressiveness will also score lower in CP.

Due to the fact that males seem to exhibit more of the playful behaviors and that previous studies have shown that more males score in the instrumental range we would expect to find males who score high in instrumentality would also score high in CP.

Hypothesis 4: Males will score higher than females on the instrumental scale and show a positive relationship to CP.

Likewise, since more females tend to score in the expressiveness range and seem to exhibit fewer of the playful type behaviors, we would expect more to be both expressive and lower in CP.

Hypothesis 5: Females will score higher than males on the expressive scale and show a negative relationship CP.

Because we are talking about gender role personality traits and not just gender, it needs to be emphasized that biological sex, sociological gender and gender role personality traits do not necessarily follow in lock step manner. That is to say, you can have masculine (instrumental) females and feminine (expressive) males. Also, we recall that there are women who do exhibit playful behaviors and instrumental traits as well as men who shunned the playful type behaviors and exhibited more expressive traits (Margolis and Fisher, 2002). Therefore we expected to find some women who are instrumental and also high in CP and some men who are more expressive and low in CP.

Hypothesis 6: Females that score high on the instrumental scale and show a positive relationship to CP.

Hypothesis 7: Males that score high on the expressive scale and show a negative relationship CP.

Interviews were conducted with participants who fell into each of the gender role personality traits categories as well as with those who results showed them to be gender aschematic. Participants who agreed to be interviewed were chosen from those whose

PAQ scores place them in the instrumental, expressive, androgynous and undifferentiated categories. In addition, males who scored in the expressive and females who score in the instrumental range were also interviewed. The interviews were used to discover how the individuals who fall into the various groups characterize their use of computers and to look for patterns of difference and commonality.

The next section will discuss the research methods that were used in this study.

Chapter 3: Methods

The purpose of this study is to determine if there is a relationship between gender, psychological gender role personality traits and computer playfulness. This will be a mixed methods study. The first part of the study will be a survey comprised of the Personal Attributes Questionnaire (PAQ) and the Computer Playfulness Scale (CPS). In addition, demographic and computer use data will be gathered. The second part of the study consisted of individual interviews conducted with participants whose responses to the questionnaires place them in various categories. The participants were asked about their computer experiences and their evaluation of those experiences as well as the role computers play in their lives. The goal of the qualitative portion of the study was to obtain information that may contribute to a deeper understanding of specific areas of interest identified in the survey results.

Participants

The participants in the study consisted of students enrolled in general education courses (English, History, Government, Psychology, Sociology, College Algebra, Intro to Computers, Speech, etc…) at a large multi-campus, metropolitan community college located in the Southwest United States. Community college students represent over half of the students enrolled in higher education and consist of a more diverse population of students in terms of age, race/ethnicity and computer experience than do students enrolled in competitive 4-year institutions (AACC, 2000). To increase the chance of

getting participants from a variety of majors, students were chosen from courses that are representative of the core general education transfer courses and the general education courses required for most workforce majors. These included freshman and sophomore level English, History, Government, Psychology and Sociology courses. The goal was to get 250-300 participants. This was done to increase the likelihood that subgroups as determined by survey results would be large enough to perform statistical analysis.

Instrument

The instrument used in this study was comprised of the PAQ and the CPS as well as items assessing basic demographic data and frequency of computer use. The PAQ was developed by Spence and Helmrich in 1975 as a response to the Bem sex role inventory. The authors felt that the Bem sex-role inventory had too many negative items on the feminine scale. The authors also believed that gender was much broader than could be measured by either instrument so they chose instead to focus on particular dimensions of gender role personality traits. In this case, the PAQ looks at gender role agency. That is, the tendency to be expressive or instrumental in the way in which one functions. Those who are expressive (usually associated with femininity) tend to focus on relationships with others and gear their activities toward strengthening those relationships. Those who are instrumental (usually associated with masculinity) tend to focus on independent action separate from and often in competition with others.

The PAQ consists of 24 items designed to elicit gender role agency. There are 8 items on each of the expressive and instrumental scales. The 8 items on the instrumental scale are designed to reflect characteristics that are typically associated with males but

are socially desirable for both sexes. The expressive scale contains items that are typically associated with females but are socially desirable for both sexes. The third scale noted as the "M-F" scale contains a mix of items that are usually only thought of as positive for one sex. This scale contains 2 "masculine" items and 6 "feminine" items. On this scale the "ideal male" is at the high end of the scale and the "ideal female" at the low end. After completing the PAQ, participants are given scores ranging from 0-32 on each of the three scales.

If one scores above the median split on the instrumental scale and below the median split on the expressive scale then they are categorized at instrumental (Spence, et al., 1974). Scoring in the reverse would categorize one as being expressive. Scoring above the median split on both scales places one in the androgynous category. Finally, scoring below the median split on both places one in the undifferentiated category. The PAQ has consistently shown reliability Alpha's in the 70's and 80's indicating a high degree of reliability. It has also shown high correlations with other measures of gender role personality traits and sex differences. Along with these four categories, one can also be classified as gender aschematic if one's biological sex is directly opposite of the gender role personality traits (Bem, 1977). For example males who score as expressive and females who score as instrumental would be considered gender aschematic. This is because they are not aligning with their gender schema (Bem, 1977).

After completing the PAQ, participants were asked to complete the Computer Playfulness Scale (CPS) developed in 1992 by Webster and Martocchio. The CPS is a seven item instrument that asks participants how they feel when interacting with a

personal or microcomputer. The CPS has been validated by its authors under a variety of conditions for construct and discriminant validity as described in chapter 1. To check for the state of playfulness (temporary playfulness) versus the trait of playfulness (general playfulness), participants were asked to answer items related to their perception of their use of computers in four different settings. They were first asked how they feel when interacting with a computer in general. Then they were asked how they feel when interacting with a computer at work, at school and at home. Participants were also asked for selected demographic data including age, biological sex, race/ethnicity, frequency of computer use, college experience and college major.

The results of the surveys will yield 3 scores that were used to categorize participants into the various groups. Based upon their relationship to the median split, participants fell into the PAQ categories identified above. These categories were compared to the performance on the CPS under each of the four conditions to see if there is any difference in setting or difference between groups. In addition interactive effect of sex, gender role personality traits and playfulness were assessed.

Research Questions

This study addressed the following research questions:

Are there differences in computer playfulness based upon setting?

Is there a main effect for gender role personality traits in predicting computer playfulness?

Is there a main effect for biological sex in predicting computer playfulness?

A Repeated Measures ANOVA, was used to help determine if there are between group differences for the independent variables and if there were interactive effects.

After the statistics were compiled, the demographic data were added to the model of the equation to look for main and interactive effects for age, race, computer use, college major, and college experience.

Research Hypotheses

Based upon the previous research and review of the literature the following hypotheses were investigated.

Hypothesis 1: There will be significant differences in Computer Playfulness (CP) based upon setting.

Hypothesis 2: Those scoring higher in PAQ instrumentality will show a positive relationship to CP.

Hypothesis 3: Those scoring higher in PAQ expressiveness will also score lower in CP.

Hypothesis 4: Males will score higher than females on the instrumental scale and show a positive relationship to CP.

Hypothesis 5: Females will score higher than males on the expressive scale and show a negative relationship CP.

Hypothesis 6: Females that score high on the instrumental scale and show a positive relationship to CP.

Hypothesis 7: Males that score high on the expressive scale and show a negative relationship CP.

Data Collection Procedures

The community college professors were contacted by a letter placed in their campus mailbox, informing them about the research study. They were asked if they are willing to let their class participate. Professors were asked for 15 minutes at the beginning of class to distribute the surveys and to go over the informed consent document. Surveys were distributed to students at the beginning of class, completed and retrieved during the same class meeting. To assess whether there were differences between CP based upon setting and if there were differences in gender or gender role personality traits as related to computer playfulness a repeated measures ANOVA was performed. When there are two or more repeated measures of the same variable under different conditions the repeated measures ANOVA is preferred. In this case repeated measures ANOVA is preferred because of the nature of the data and the assessment of CP under the four conditions. In addition, the procedure allowed for the assessment of

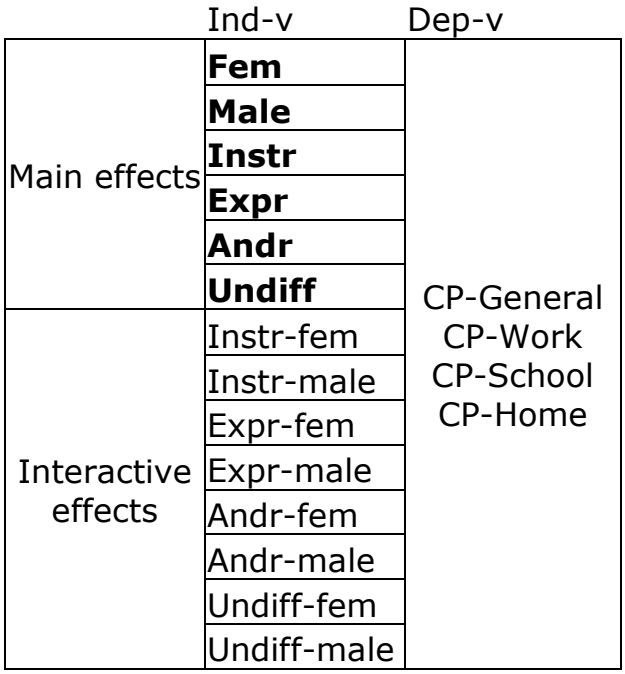
interactive effects that other regression analyses did not. As part of the informed consent document students were asked to indicate if they were willing to be interviewed about their responses and their computer use. After the data from the surveys was analyzed, 2 participants from each of the PAQ categories (one male and one female), as well as those who are gender aschematic who agreed to be interviewed, were contacted for one-on-one interviews. The interviews took place on an ACC campus in the adjunct faculty office when the student's schedule and availability allowed. The interviews were be digitally recorded using an Apple iPod Video. The remaining students were contacted by telephone and interviewed using Skype and Call Recorder to digitally record the interview on an Apple 2GHZ Dual core Intel MacBook computer. The interviews were transcribed and analyzed for patterns of responses and descriptions of participant's computer experiences. During the interviews participants were presented with the results of the survey. Participants were also asked about how they characterize their experience when interacting with a computer. Participants were further asked about their perception of gender role personality traits in their daily activities. When necessary, follow up questions were asked. At the end of this analysis what developed was a picture of the role that gender role personality traits plays in the development of computer playfulness as well as an image of what the individual experiences of the various gender role personality traits groups look like.

Data Analysis

Once the surveys were completed, content validity were checked for each of the PAQ scales and CP using Chronbach's Alpha. Descriptive statistics were reported in order to help define the population sample. In preparation for the statistical analysis the sex of the participants were coded as either 1 for female or 0 for male. Scores on the instrumental and expressive scales of the PAQ were use to determine gender role personality traits. The scores on each scale were used in the analysis. Finally, the scores on each of the CP conditions were entered into the analysis model.

The model of the study investigating the relationship between sex, gender role personality traits and computer playfulness used repeated measures ANOVA. The repeated measures design looked at CP under 4 different conditions and allowed for discovering the within subjects differences on CP, the between subjects differences for sex and gender role personality traits as well as interactive effects of the independent variables on CP. This procedure has greater power to detect difference than other measures and can show relationships in cells with smaller N's (Warner, 2008).

Figure 1: Model--Main effects and interactive effects of the independent and dependent variables.



Mauchly's sphericity test was conducted to test for assumptions of equal variances. Since the assumption was violated the Greenhouse-Geisser Epsilon correction was used. The Greenhouse-Geisser Epsilon is more conservative making the test more rigorous and decreases the likelihood of a type I error (ACITS, 1997).

Analysis of Qualitative Data

After sub groups were identified through the results of the PAQ, participants who agreed to be interviewed were contacted. After the interviews were complete, the recorded interviews were transcribed. The participants were contacted again to allow for

member checking and verification of their responses. Once member checking was complete, the interviews were analyzed for phenomenological meaning and expression. We looked for how participants saw their actions as being influenced by gender role personality traits and to what degree, if any, they saw their computer experience as being influenced by gender role personality traits. Differences and similarities between groups and within groups were also noted. Finally, comparison of qualitative responses to survey responses was considered. This was done to see if there was congruence between the survey results and the participants' descriptions of their experience and their individual results from the survey.

Chapter 4: Results

The goal of this research was to determine if there are differences in gender and psychological gender role personality traits as related to microcomputer playfulness and measured by an instrument comprised of modified versions the Personal Attributes Questionnaire (PAQ) and the Computer Playfulness Scale (CPS). The specific research questions addressed in the study were:

> Are there differences in computer playfulness based upon setting?
> Are there differences in computer playfulness based upon gender role personality traits?
> Are there differences in computer playfulness based upon biological sex?
> Are there interactive effects between biological sex and gender role personality traits for computer playfulness?

To address the above questions, surveys were distributed to students enrolled in psychology and sociology courses in a Southwestern, United States metropolitan community college. Classes were chosen from the list of faculty who responded to an email solicitation. Most of the classes included in the study were introductory level courses. A smaller number included more specific courses such as Human Sexuality or Human Growth and Development. Surveys were distributed and collected during a single class session. The survey instrument used in the study acquired basic demographic data such as age, race/ethnicity, sex, academic class, along with academic major, and included modified versions of the Computer Playfulness Scale and the Personal Attributes Questionnaire (PAQ). The PAQ items asked participants to rate themselves on 24 items of gender role personality traits polar opposites using a 5-point scale to indicate which end of the spectrum they identified with the most. The instrument yields a scale for

masculine or instrumental traits as well as a scale for feminine or expressive traits. Cronbach's Alpha was performed on each scale of the PAQ. Both scales showed an alpha rating of .80, well above the recommended .70 for internal consistency (Nunnaly, 1978). The instrument also included items from the Computer Playfulness Scale (CPS). These items are designed to gauge an individuals' tendency to be playful when using a computer. The 7 items are rated on a 7-point scale indicating the extent to which participants agree with the adjective describing their experience when using a computer. This part of the instrument was repeated 4 times to assess the students level of playfulness when using a computer in general, for work, for school, and at home but not for work or academic purposes. Cronbach's Alphas were also performed for each instance of the CPS. The analysis revealed alpha ratings of .74 for computer playfulness in general, .80 for computer playfulness at work, .91 for computer playfulness at school and .80 for computer playfulness at home. All of these ratings indicate high or at least acceptable internal consistency for these results. In addition to the quantitative analysis, a subset of participants representing the various categories of the PAQ and CPS were interviewed about their experiences of gender role personality traits and computer use.

Hypotheses

There were seven hypotheses investigated for this study.

Hypothesis 1: There will be significant differences in Computer Playfulness (CP) based upon setting.

Hypothesis 2: Those scoring higher in PAQ instrumentality will show a positive relationship to CP.

Hypothesis 3: Those scoring higher in PAQ expressiveness will also score lower in CP.

Hypothesis 4: Males will score higher than females on the instrumental scale and show a positive relationship to CP.

Hypothesis 5: Females will score higher than males on the expressive scale and show a negative relationship CP.

Hypothesis 6: Females that score high on the instrumental scale and show a positive relationship to CP.

Hypothesis 7: Males that score high on the expressive scale and show a negative relationship CP.

Survey Results

In all, 399 surveys were distributed and collected from the classes for which instructors agreed to allow their students to participate during the spring of 2008. As shown in Table 1, 254 (64%) were in the age range of traditional college age students

(17-22). Another 49 (12%) were between 23 and 25 years old. Only 31 (8%) were over 35, with half of those being over 40 years old. Table 1 also indicates the race/ethnicity of the study participants. As shown on this table, over half of the participants (55%) identified themselves as European American (white). The other 45% of the participants included Hispanic/Latino (22%), African-American (black) (8%), Asian American (5%), international (6%), and 5% who identified as a combination or other (Table 1). Females represented 60% (238) of those who took the survey with males making up the remaining 40% (161).

Table 1: Age Ranges and Race/Ethnicity of Study Participants

Age of Participant	Number	Percent	Race/Ethnicity	Number	Percent
17-22	254	64%	African-American (Black)	30	8%
23-25	49	12%	Asian-American	19	5%
26-30	41	10%	European-American (White)	219	55%
31-35	23	6%	Hispanic/Latino	86	22%
35-40	17	4%	Native American (America Indian)	1	<1%
40+	14	4%	International	23	6%
no answer	1	<1%	Other	21	5%
Total	399	100%	Total	399	100%

Table 2 shows the academic major and experiences of the participants. This included 58% (232) who had earned fewer than 30 college credit hours and another 27% (108) who earned 31-60 college credit hours. Even though the participants were all enrolled at a community college many had obtained upper division and graduate credit from other

institutions. There were 10% (41) who had earned 61 or more college credit hours and 3% who had taken some graduate level courses. It should be noted that the Psychology, Human Growth and Development course is a prerequisite course for students pursuing an associate's degree in nursing and allied health. Some of these students may already have degrees in other areas and were now studying for a degree in a health related field. In this study 34% of those completing surveys were nursing and allied health majors. The next largest groups were "undecided" and liberal arts majors each representing 14% of respondents. Business majors represented 12% of the sample while science engineering and math majors represented 10%. The remaining 18% were education majors (5%) with communications and legal and criminal justice majors each representing 4% of the respondents. Graphic and fine arts majors accounted for 3%

Table 2: Academic Major and Academic Experience of Study Participants

Academic Major	No.	Percent	Academic Experience	No.	Percent
ALHS/Nursing	137	34%	<30 hours	232	58%
Business	49	12%	31-60 hours	108	27%
Communication	15	4%	61-90 hours	32	8%
Education	18	5%	>90 hours	9	2%
Graphic and Fine Art	11	3%	Graduate hours	13	3%
Law & Criminal jus	15	4%	No response	5	1%
Liberal Arts	55	14%			
Sci/Engineer/Math	38	10%		399	100%
Undecided	55	14%			
other	6	2%			
	399	100%			

while 2% had majors that were either work force or vocational majors or did not fall into any of the areas noted above. The survey instrument asked the subjects to indicate their weekly computer use. Computer use was clustered into 5-hour increments as shown in Table 3, with 44% of the sample reported using a computer less than 10 hours a week and 41% using a computer more than 15 hours a week.

Table 3: Weekly Computer Use by Study Participants

Hours per week	number	percent
<5	65	16%
5-10	113	28%
11-15	59	15%
16-20	55	14%
>20	107	27%
Total	399	100%

The first research question looked for differences in microcomputer playfulness across 4 settings (general, work, school and home). For analysis purposes only the surveys that had all 4 of the CPS parts completed were used (participants were instructed that if they did not use or have never used a computer at work or if they did not use or have never used a computer at home, they could leave those portions blank). From this sample, 143 participants left one or more of the CPS areas blank. These were not used in the statistical analysis. This reduced the final sample to 256 surveys.

Quantitative Analysis

The first hypothesis for this study was that there would be differences in computer playfulness (CP) based upon setting. That is the level of CP was predicted to vary

dependent on where the individual used the computer. To address this question, a repeated measures ANOVA was conducted using SPSS. Mauchly's W (Table 4) showed that for this sample the assumptions of sphericity were not upheld (.644, chi ^2 = 108.695, p< .000) so the Greenhouse-Geisser correction was used as shown Table 5.

Table 4: Mauchly's W Tests of Sphericity

Within Subjects Effect

	Approx. Chi-Square	Epsilon	df	Sig	Greenhouse-Geisser	Huynh-Feldt	Lower-bound
setting	.644	108.695	5	.000	.766	.795	.333

As shown on Table 5, the repeated measures ANOVA, adjusted using the Greenhouse-Geisser correction indicated that there were differences based upon setting (F. =86.365, p< .000). This means that hypothesis 1 was upheld due to the finding that there was a difference in CP scores based upon setting. Pairwise comparison (Table 6) showed that CP in general (CP-G) was significantly higher than CP at work (mean diff. = 5.595, p< .000). CP-G was also higher than CP at school (mean diff. = 2.264, p< .000). In addition, CP at school (CP-S) was higher than CP-W (mean diff. = 3.331, p<.000). CP at home (CP-H) was higher than CP-S (mean diff= 4.756, p< .000). Finally, CP-H was also higher than CP-G (mean diff. =2.492, p< .000). According to these results, participants were higher in computer playfulness when using a computer at home than they were

when using a computer in general. They were lowest in computer playfulness when using a computer at work.

Table 5: Repeated Measures ANOVA- Greenhouse-Geisser correction

Tests of Within-Subjects Effects

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Noncent. Parameter	Observed Power
CP	7873.669	2.298	3425.944	86.365	0	198.488	1
CP * Sex	99.705	2.298	43.383	1.094	0.342	2.513	0.259
CP * Genrole	37.106	6.895	5.382	0.136	0.995	0.935	0.087
CP * Sex * Genrole	303.599	6.895	44.033	1.11	0.355	7.653	0.478
Error (CP)	22609.546	569.966	39.668				

CP=Computer Playfulness Across all 4 settings

Table 6: Repeated Measures ANOVA Pairwise Comparisons for CP Setting

Setting(1)	Setting(2)	Mean Difference Between Settings (1-2)	Std. Error	Sig.	95% Confidence Interval for Difference Lower Bound	Upper Bound
G[1]	W	5.595*	.579	.000	4.454	6.735
G	S	2.264*	.421	.000	1.435	3.093
G	H	-2.492*	.381	.000	-3.242	-1.742
W	G	-5.595*	.579	.000	-6.735	-4.454
W	S	-3.331*	.586	.000	-4.486	-2.176
W	H	-8.087*	.659	.000	-9.384	-6.789
S	G	-2.264*	.421	.000	-3.093	-1.435
S	W	3.331*	.586	.000	2.176	4.486
S	H	-4.756*	.454	.000	-5.650	-3.862
H	G	2.492*	.381	.000	1.742	3.242
H	W	8.087*	.659	.000	6.789	9.384
H	S	4.756*	.454	.000	3.862	5.650

[1]G=General, W=Work, S=School, H=Home; * significance < .001

The second and third hypotheses looked at the relationships between gender role personality and CP. More specifically, hypothesis 2 predicted that those scoring higher in PAQ instrumentality would also score higher in CP while hypothesis 3 predicted that those scoring higher in PAQ expressiveness would also score lower in CP. Through the analysis of variance (Table 7), there was a main between subjects effect for gender role

personality traits (F= 3.716, p=.012). Pairwise comparison for gender role personality traits (Table 6) showed that those who were in the androgynous category (scoring high on both instrumentality and expressiveness) scored significantly higher in CP than those who scored in the undifferentiated (scoring low on both instrumentality and expressiveness) category (mean diff. =3.165, p= .001). Those scoring high in instrumentality but lower in expressiveness (instrumental) also scored higher in CP than those who were undifferentiated but that difference approached, but failed to reach significance (mean diff, =1.884, p= .076). This means that hypothesis 2, which predicted that those who scored higher in instrumentality would score higher in CP and hypothesis 3 which predicted that those who scored higher expressiveness would score lower in CP were not upheld. Only those who scored higher in both instrumentality and expressiveness were significantly higher in CP than those who scored low on both instrumentality and expressiveness.

Hypotheses 4-7 predicted interactive effects for gender role personality traits and sex for CP. Hypothesis 4 predicted that males would score higher than females in the instrumental range and be higher on CP while hypothesis 5 predicted that females would score higher than males in the expressive range and be lower on CP. Hypothesis 6 predicted that females who scored high in CP would also score high in instrumentality and hypothesis 7 predicted that males who scored low in CP would also score high in expressiveness.

As shown in Table 7, there were no interactive effects with gender role personality traits; hypotheses 4-7 were not upheld. Hypothesis 4 which predicted that males would score

higher in the instrumental range and be higher on CP was not upheld. Also hypothesis 5 predicted that females would score higher in the expressive range and be lower on CP was not supported. Likewise, the finding of no significant interactive effects for sex and gender role personality traits means that hypotheses 6, which predicted that females who scored higher in CP would also score high in instrumentality, and hypothesis 7, which predicted that males who scored low in CP they would also score high in expressiveness, were also not upheld.

Table 7 shows there were no interactive effects between gender role personality traits and sex (F=1.110, p=.355). There was however, a main between subjects effect for sex (Table 7) with males being higher than females on CP (F= 4.271, p= .040). In addition, analysis of variance (Table 7) showed that there were no interactive effects for setting were shown for either sex (F.= 1.094, p =.342) or gender role personality traits (F=.136, p=.995).

Table 7: Repeated Measures ANOVA Tests of Between-Subjects Effects

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Noncent. Parameter	Observed Power
Intercept	270072.927	1	270072.927	8.698E3	.000	8697.888	1.000
Sex	132.609	1	132.609	4.271	.040	4.271	.539
Genrole	346.156	3	115.385	3.716	.012	11.148	.803
Sex * Genrole	69.506	3	23.169	.746	.525	2.238	.209
Error	7700.500	248	31.050				

Table 8: Repeated Measures ANOVA Pairwise Comparisons for Gender role personality traits with Bonferroni Adjustment

(1) Gen role	(2) Gen role	Mean Difference (1-2)	Std. Error	Sig.[a]	95% Confidence Interval for Difference Lower Bound	Upper Bound
Andr	Expr	1.539	1.057	.147	-.543	3.621
Andr	Instr	1.281	1.013	.207	-.714	3.275
Andr	Und	3.165*	.950	.001**	1.294	5.036
Expr	Andr	-1.539	1.057	.147	-3.621	.543
Expr	Instr	-.258	1.155	.823	-2.533	2.016
Expr	Und	1.626	1.100	.141	-.541	3.793
Instr	Andr	-1.281	1.013	.207	-3.275	.714
Instr	Expr	.258	1.155	.823	-2.016	2.533
Instr	Und	1.884	1.057	.076	-.198	3.967
Und	Andr	-3.165*	.950	.001**	-5.036	-1.294
Und	Expr	-1.626	1.100	.141	-3.793	.541
Und	Instr	-1.884	1.057	.076	-3.967	.198

[a]Significance less than <.05; **p< .001

The key findings for this part of the study were that participants tended to be higher in playfulness when using a computer at home than when using a computer in general, using a computer for school or using a computer at work. In addition, those who are androgynous (scoring high on both instrumentality and expressiveness) tend to be more playful when using a computer than those who are undifferentiated (scoring low on

both instrumentality and expressiveness). The other significant finding was that males showed higher levels of CP than females.

In addition to the survey results, participants were interviewed about their perception of their computer use, computer playfulness and their thoughts on computers and gender role personality traits. The qualitative results will be addressed in the next section.

Qualitative Analysis

In order to better understand how participants experience gender role personality traits and computer playfulness in their own lives, 12 participants were interviewed during summer and fall of 2008. The participants were chosen from the four categories of the PAQ (Instrumental, Expressive, Androgynous and Undifferentiated) and those scoring high and scoring low on the CP. One male and one female were interviewed from each group.

Table 9: Coded names for interview subjects

Code Name	Interview Category	Gender Role	Computer Playfulness	Sex
Tim	I M	I	HCP	Male
Tiffany	I F	I	LCP	Female
Rex	E M	E	HCP	Male
Sara	E F	E	HCP	Female
Sam	A M	A	HCP	Male
Pam	A F	A	HCP	Female
Dudley	U M	U	LCP	Male
Eunice	U F	U	LCP	Female
Pablo	HCP M	A	HCP	Male
Fanny	HCP F	A	HCP	Female
Lars	LCP M	U	LCP	Male
Laura	LCP F	E	LCP	Female

Instrumental = I, Expressive = E, Androgynous = A, Undifferentiated = U, High Computer Playfulness = HCP, Low Computer Playfulness = LCP, Female=F, Male=M.

All of the interviews except one were conducted over the phone and recorded using Skype Internet telephony software. The one interview conducted in person was recorded using an iPod and external microphone. The interviews were transcribed and the answers entered into a database and coded. The records of the database were based on the participant's category of interview. For example the male who scored high on instrumentality and the female who scored high on instrumentality each represented a separate record. Answers were then grouped by question topic and then checked for themes or trends. The responses were first checked to see if any trends followed gender,

gender role personality or computer playfulness categories. Then they were checked to see if they supported or contradicted the quantitative research. Finally, any unanticipated or surprise findings were noted. All participants in the qualitative part of the study were asked the same set of questions. During the course of the interview follow up questions and elaborations were asked if needed for clarifications on responses. An example of this would be if someone responded with a one word or one sentence response, they were asked to elaborate.

The questions were in 4 groupings. The groupings addressed personal leisure time, awareness computer playfulness, awareness of gender role personality traits, awareness of potential relationships between gender role personality traits and computer playfulness. Trends or themes mentioned above were then noted for each set of questions.

Table 10: Questions on leisure time

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1). Could you please describe your after work/school responsibilities at home (caring for children, other family members, domestic duties, 2nd job, hobbies, volunteer activities, etc).

a. What activities would you most likely engage in if you didn't have this primary responsibility?
b. How much leisure time (time to do things you want to do rather than the things you have to do) would you say you have in a given week?
c. What activities do you engage in during your leisure time?
d. Do you consider your use of the computer outside of work and school to be leisure or would you characterize it differently?

The first set of questions (Table 10) looked at participants' leisure time. The first theme noted was women's lack of leisure time. When asked what takes up their time outside of school and work all but one of the females mentioned caring for others; either children, family members or pets. In other words, the females described their lives in expressive terms. Their lives tended to be centered on their relationships with others. Because of this most expressed a lack of leisure time.

For example Tiffany (code name for the instrumental, low CP female --I-LCP) responded, "I have 3 daughters, one-year old, 6 year-old and 11 year old. I am married." Pam, the androgynous, high CP female (A-HCP), more completely explained,

> I can tell you I have no hobbies, I work 7 days week and have two kids and so I juggle my kids my work and school. I have been doing this about 3 years now. There are really no hobbies because I don't have any down time for myself…
>
> -Pam, A-HCP

These sentiments are echoed by Eunice (U-LCP):

> Tend to my two children, 5 year old and 19 month old so I am stuck with the house cleaning, organizing the bills making sure everything gets paid, making sure they're fed… daily duty that a woman does. I have no life for myself.
>
> -Eunice, U-LCP

Even when offspring were not involved there were nurturing duties as in the case of Fanny (A-HCP),

> I have 2 cats. I substitute teach and work at the book store and am on call and do a lot of work at the church, children's ministry, help teach Sunday school and do stuff with my singles group.
>
> -Fanny, A-HPC

This is contrasted with the males, one of which mentioned caring for children and another who seemed to mention it as an afterthought. Tim (I-HCP), responded, "I do have a two-

week old boy and 15 month old girl. On top of that it is my turn to cook dinner… If I don't cook dinner then I am doing dishes. I also have a second job..." Dudley (U-LCP) put it this way, "There are few things primarily that take up my free time. I am a full time employee at the ad firm so school is not my primary… I am not a full time student. School takes up a big piece. I take care of my child. I have one child."

Another male, Rex, whose PAQ score placed him in the expressive category and scored high on CP, mentioned caring for a pet and also mentioned having a relative in the hospital that he visited regularly, "My grandma is in the hospital so I hang out with her once a week…I hang out with friends and if they need help I help them if I can. Other then that I work, school, play video games. Take care of my cat."

The other males tended to focus more on their own activities.

> I don't have any after work responsibilities. I work Friday thru Sunday 12 hr shift. I have during the week off. So during the week I go to school. So when I am done with school I am done. I don't have any actual real responsibilities. I am married. I do stuff with my wife, I play games and I practice a number of tactical skills, I do archery. I do a number of things. It just depends on how I feel that day. I have a good deal of leisure time.
>
> -Sam, A-HCP

Pablo (A-HCP), noted, "Actually I work at home. Work time and home time separation…It's pretty much always mixed. I multitask." Lars, a single, U-LCP male, responded, "After work and school I watch the Sopranos, … I like to watch the Discovery channel and science shows, …" However, Lars did have what might be considered a nurturing volunteering activity, "…working the Alanon program now and was just recently invited to go to a private hospital there and lead meetings, which I should start doing in a couple of weeks…"

Some of the themes noted from the questions on leisure were that most of the females, regardless of PAQ category or level of computer playfulness, had nurturing duties at home, while most of the males did not. One of the males who did note nurturing responsibilities one was in the expressive PAQ category. Even when they did have nurturing duties, the males still had or made time for leisure activities.

Other themes centered on how people spend their leisure time or would spend it if they had it. When asked what they would do if they did not have this primary responsibility, all of the female respondents mentioned doing something outdoors or sports related. This ranged from playing softball or fishing to watching sports with friends. One example was Tiffany, the instrumental female (I-LCP), who said," I would probably spend more time outside of the house. Like sports, softball and volleyball and things I used to do before I had kids." Sara (E-HCP) also focused on outdoor activities, "Snorkeling, Going outside, or working out."

Eunice (U-LCP), responded similarly, "[I'd] Be out doing my own activities. Out jogging or exercising." This was in line with Laura (E-LCP), who responded, "Fishing, golf, sports." Although she did not mention participating in sports, Fanny (A-HCP) did mention watching sports outside of the house, "I do go to the movies. Eat out with my friends. Like to go to sports and see the [San Antonio] Spurs play and UT games…" So the theme we see here is that females not only do not have much leisure time but, if they did have leisure time then they would want to get out of the house.

This is a key finding because when asked about their computer use outside of school and work, respondents who used a computer outside of school or work considered

their use to be leisure. Tim (I-HCP) responded, "Leisure and creative as well. On one of my computers I have a small recording set up and compose music." Tiffany (I-LCP) was equally direct, "It would absolutely be leisure." Rex (E-HCP) was more detailed, "Leisure, because generally when I get on to my computer I check my e-mail, to check to make sure there are no announcements on school and to play video games and I also read comic books on line." Sam (A-HCP) also mentioned games; "I would say I spend more time playing games on the computer than anything else." Fanny (A-HCP), mentioned games and other activities,

> "When I had my land line at home I was on the computer all the time. I was doing computer games. I downloaded games. I was also looking up stuff I was interested in reading or if my mom wanted me to look up something for her. I would download pictures and stuff that my niece would send me."
>
> -Fanny, A-HCP

This is consistent with the quantitative findings that showed participants tended to be more playful when using a computer outside of school and work.

This study showed that females do not have much leisure time. It also showed that if they did have leisure time they would want to be out of the house. Because of this, then one has to wonder how much time they would spend using a computer if they had the time. Since the qualitative analysis showed males to be higher in playfulness than females and that people tend to be most playful when using a computer at home, it seems quite possible that one contributing factor could be that females are simply using the computer less at home due to time constraints and choosing not to use the computer as a leisure time activity. Because this is based on interviews with a small sample, it certainly points to an area for further investigation.

The next set of questions asked participants about their sense of microcomputer playfulness (Table 11).

Table 11: Questions on computer playfulness

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2). Prior to participating in this study, did you tend to see yourself as computer playful?

a. Can you describe what is usually going through your mind as you are using a computer?

b. Can you describe how you think or how you feel when doing different tasks in the computer?

c. Would you describe your experience when using a computer as more of chore or more of a joy?

d. How would you feel if you came into work or school tomorrow and were unable to use a computer?

e. What is the longest that you have gone without using a computer?

f. For what kinds of things do you use a computer in your leisure time?

g. How would you feel if today, you went home and were unable to use a computer for the rest of the day? What if you were unable to use it for the rest of the week?

There were conflicting results when participants were asked if they considered their interaction with the computer to be playful. As expected, based upon the quantitative analysis, which indicated that those who were undifferentiated tended to score lower in CP, both participants who fell into the undifferentiated category indicated they did not consider their use of the computer to be playful. As Dudley, the undifferentiated male put it,

> Not so much because I tend not to. I tend to be somewhat practical about my use that relative to some people I know that I know, are very playful with their computers... I don't use my computer for my music and I don't play games."
>
> -Dudley, U-LCP

The quantitative analysis also showed that those who were androgynous tended to score higher in CP but, in this case the androgynous female sounded more like the undifferentiated participants when asked if she thought of herself as computer playful,

> No. To be honest with you no...like if I need something done or if I am at home, which is really rare, I will get my daughter to go online to research that for me and get the information because I am such a Type A personality when I am home … I don't feel like going on the computer and looking through different sites I want to get what I want where it's at and leave it alone.
>
> -Pam, A-HCP

Her perception may reflect the other findings of the quantitative results also showed that women tended to score lower in playfulness than men. Her perception could also reflect the variation that occurs within groups. Quite simply, she could be one of the androgynous individuals on the lower end of the spectrum.

This pattern was repeated when participants were asked to characterize their home use of the computer. Once again we had an androgynous respondent reflecting more of a low CP response. In this case Sam characterized the use of computers as a chore because time in front of the computer took away time with patients..

> "I would say it would be a chore. I mean I like it to a point but I know I have to get on it to do it. … with the position I am in I have to get on get the information I need and get out because that means the more time I spend behind the computer in an office that I am missing referrals or patients that come into our facilities…"
>
> -Sam, A-HCP

The undifferentiated female, Eunice, also sees the use of the computer as a chore but for different reasons:

> I think in the end I find it more of a chore. At work it is work and sometimes it is fun but I don't associate the computer with the fun element. But when I am at home it sometimes feels that there is so many possibilities in terms of news to read and music to look at or whatever it is and so many things to find out that sometimes it becomes a bit burdensome."
>
> -Eunice, U-LCP

This was in line with the other undifferentiated participant who scored low in computer playfulness and who did not seem to enjoy the interaction the computer.

> Just concerned about completing my task, like for doing some anatomy homework and don't know what it means, I throw it into Google, bam there's the answer, next question. It's just a tool. It's like what are you thinking about when you're using a screwdriver I need to get the screw in. It's not a game. I enjoy using the machine but not to play computer games with.
>
> -Lars, U-LCP

The female low CP respondent, Laura (E-LCP), was more direct. When asked what she thinks about when using a computer she responded, "Usually stresses, like school stresses."

Once again this can be contrasted with those high in playfulness, who seem to revel in the interaction. Pablo (A-HCP) responded, "I know how to use the computer really well. I kinda' get excited… I like being on the computer. That's the way I live. I am on the computer every day." Fanny (A-HCP), also mentioned enjoying the interaction,

> "It depends on what I am doing. If it is something that is boring I will switch to something else. A lot of times I try to do creative writing in my Journal. I like to play around and write. See how creative I can get."
>
> -Fanny, A-HCP

Of course when asked to characterize her experience when using a computer this respondent gave a more conditional response:

> "I see it as both… It is a chore with homework and assignments. It is a joy when I can sit down and write to a friend or write a short story or poetry or play some video games."
>
> -Fanny, A-HCP

Her comment points out the importance of differentiating between computer use in the home, for school or for work rather than using it for personal preferences. In summary, as far as computer playfulness goes enjoyment of using the computer tends to follow along the lines of CP scores with the exception of one androgynous respondent. In brief, those high in CP enjoyed using it while those low in CP did not. Similar to the quantitative results, those whose PAQ scores put them in the undifferentiated category did not enjoy computer use. Contrary to the quantitative results one androgynous person also did not seem to be particularly playful with the computer.

One common them that emerged was that regardless of gender, personality traits or level of CP, almost all of those interviewed reported that they could not do their jobs if they could not use a computer for one day. For example, Tim (I-HCP) said, "If they told me I couldn't use my laptop today I would be very confused about what my responsibilities would be. It might help for you to know that I am in software development." This was similar to what Tiffany the instrumental female said, "For work-related I would be a little lost. Most everything we do is on the computer…" Likewise, Dudley (U-LCP) spoke of being lost if he could not use the computer at work, "I would be lost… Absolutely necessary in my work." The situation was summed up by Fanny (A-HCP)

> I would be up a creek. When the computers have crashed at my work I couldn't do anything and would just have to wait till it came back. It is kind of like when you don't have your phone, you are out of the loop. We have been programmed and are so dependent on the computer.
>
> Fanny, (A-HCP)

In summary, the results of the questioning on computer playfulness show that although the results of the qualitative part of the study indicates that individuals are less playful when using a computer for work; most rely heavily on it to do their work. The themes noted in this section tended to fall along CP levels as anticipated from the qualitative results with one androgynous outlier in this case. Those higher in computer playfulness enjoyed the interaction with computers and the less playful did not. However, regardless of the level of playfulness, a certain level of comfort with computers is necessary because nearly everyone uses one for work.

The next set of questions (Table 12) was designed to see how participants see gender-role personality traits playing out in their lives. Participants were first asked about gender role personality traits using terms from the PAQ. Specifically, they were asked if they focused more on their independence or their connectedness to others. Their responses were largely consistent with gender role personality traits. For example, Tim (I-HCP) responded, "I am a very independent guy. I can survive by myself for a long time…" The instrumental female, Tiffany (I-LCP), responded similarly, "…I am a pretty ambitious person in kind of learning what I do and deciding what I want to be and what I want to do. I have always been pretty independent…"

Table 12: Questions on Gender Role Personality Traits

---

3). Prior participating in this study, did you tend to think about how being independent or connected to others affected your actions?

a. In what ways does this affects your behavior now?
b. What are some activities or behaviors that you engage in that you see as linked to masculinity or femininity?
c. What are some activities or behaviors that you avoid that you see as linked to masculinity or femininity?
d. Do you think that you tend to place more importance on what is you do or how what you do affects others?
e. Describe how that affects your behavior.
f. Can you give an example when you've acted in a manner or took part in activities that were opposite of your masculinity or femininity?
g. How significant do you think masculinity or femininity is in affecting what people do?
h. How significant do you think masculinity or femininity is in affect how people interact?

Another example would be the expressive male, Rex (E-HCP), who focused on his connectedness to others,

> …everything everyone does affects other people. Generally, when you are doing things by yourself it doesn't affect other people but there are decisions you make that are going to affect other people….
>
> -Rex, (E-HCP)

Showing both sides of the gender role personality traits, Sam, (A-HCP) reported, "…I have always been an independent thinking type person but I have also had a very strong family connection."

This also evidenced in the comments of Pam (A-HCP),

> … I am a big people person so as far as conversating [sic], getting to know people. I like to do it one on one or a clinical situation because I am a nurse…. Actually, I am a pretty big tomboy so I would think it would be more masculinity. I get along well with men because I am really straight forward to the point person I don't beat around the bush and a lot of time that hurts females feelings and with males you can be straight up with them and they know where you're coming from.
>
> -Pam, (A-HCP)

Dudley (U-LCP), gave the clearest example of his gender role personality trait in response to this question. Recall, that undifferentiated means scoring low on both the instrumental and expressive scales, thus those scoring in this range are less likely to identify strongly with either set of gender role personality traits. When asked whether he focused more on his independence or his connectedness with others, his response was:

> Well I think that it is such a complex question. It just depends on who we are dealing with. It just takes me a minute to think about it… Just re-phrase one more time. Say it one more time. I don't know if I can give you a definitive answer on that. I think as I have gotten older that with age comes a certain degree of awareness of folks and their needs and as you go through things and experience things you realize that other people are also experiencing those things then you become a little broader of your perspective and of your consideration of other peoples experiences. I would just have to say.. I don't know if I can't say definitively I typically have to think more of what I want to do and be damned how it affects everybody else. To be brutally honest, I have become a lot more conscious of that over the years but I typically have been one to act a little bit impulsively based on my own goals and kind of agenda. It's a bit mixed, I am not sure if I can answer you definitively there.
>
> -Dudley, (U-LCP)

The above answer reflects the difficulty of the respondent in characterizing his behavior related to his independence or connectedness with others, which is consistent with the undifferentiated category on the PAQ. This is because those who score in the undifferentiated range tend to not see the world in gendered terms. However, when asked

more specifically, if there were masculine or feminine behaviors that he engaged in, he could more readily identify traditional masculine and feminine behaviors.

> I tend to be a bit competitive, which I associate with masculinity. I tend to be a bit emotionally cutoff sometimes which is probably kind of a masculine trait maybe a little self focused which can be a bit masculine and incommunicative. And then from a feminine perspective I prefer to speak on an emotional level rather than about the big game. Sometimes, I am conscious of my appearance and fashion that is a bit feminine, not excessively so but I do find I can't engage in that type of conversation with men.
>
> -Dudley, (U-LCP)

This was typical of the responses others gave when asked specifically about masculine and feminine behaviors. All seem to have clear ideas of gender-linked behaviors. For example Tim (I-HCP), said, "My role as a dad. Definitely. I will be doing a lot more horseplay with my son than with my daughter…" Whereas Tiffany (I-LCP), responded:

> I can see where I am not kind of a froo-froo and pink and feminine side, I am more athletic and jeans and t-shirt kind of person and if I could go years and years without wearing heels and skirts I would be just fine but having to wear them doesn't bother me it just not convenient for me but it doesn't hurt me. I guess I have a lot more masculine tendency especially wanting to be on top and ambitious and being ready to leave people behind if I need to.
>
> -Tiffany, (I-LCP)

This is in direct contrast to Sara (E- HCP). Her responses were expressive and highly feminine, "Housework, taking care of the family. Helping out with work and stuff. Try not to be the main income, just helping out. Basically like family I guess."

Sam (A-HCP) was quick to identify gender-linked behavior but then to minimize it.

> My job in general is stigmatized in general with femininity…nursing in general, people see, 'oh nurse', a woman...caretaking is considered feminine. I do archery; I have been doing that about 12 years. I consider that more masculine then feminine. I have always looked at anything I see…I see both men and women doing it. But if I think about social context, I can see how something would be more masculine. A good example is the Tour de France there are no women. But if anyone asks me about cycling, if that was masculine or feminine, I would say of course that is both. If you go down 360 you see both men and women bicycling.
>
> -Sam, (A-HCP)

Since respondents could easily identify gender-linked behaviors they engaged in, it might be expected that they would also be able to identify gender-linked behaviors that they avoid. However, only the expressive female, Sara (E-HCP), clearly identified gender linked behaviors she avoided. Her response to the question of whether there are behaviors related to masculinity or femininity that she avoided was highly mascline, "Hard work, anything that is heavy to do or something that I know that I am not able to do. Heavy work, like carrying out weights or something." Most of the other responses ran along the lines of Tiffany (I-LCP) who said, "…I try not to be a stereotype. There's not really anything that I avoid. Not so much. I do things I like and I don't do things I don't like. I don't think of it like that's too girlie or that's a man thing."

Once again, this is not to say that they do not recognize when they are engaged in gender-linked behaviors. When asked if there were behaviors that they have engaged in that are opposite of their gender, most could come up with examples. Pablo (A-HCP), for example said, "I like to cook. I sew sometimes. I can actually make new garments. Some of the things you mentioned like babysitting I don't mind." Similarly, Rex (E-HCP) noted, "I put on eyeliner when I went up to a concert so I guess that would be considered feminine but I don't care. Eyeliner is eyeliner and I only did it a couple of

times, that's not really an excuse or defending it but if people want to do it let them do it." Sara (E-HCP), who is from a Latin American country, identified what she considered gende- based occupations, "I worked delivery pizza before and it was more like guys. Because I see guys doing that all the time and I don't see girls doing the work…Girls' work would be more like an inside job or office." She further exemplified this when asked if she thought masculinity or femininity had an effect on what other people do. Her response was,

> Everyone has their own role, I am really very feminine and I know other people that are more masculine; it's personality…The world today doesn't see that anymore, but I do have it. They see it ok for a girl to do a concrete job, they don't care but for my part, I wouldn't feel like a girl.
>
> -Sara, (E-HCP)

Others did not see masculinity or femininity affecting others behavior so succinctly. They did, however, clearly note how masculinity and femininity affected how people interact. Often the comments were in relation to interpersonal relationships. Rex (E-HCP) saw it this way

> I kind of feel like if you go and talk to a girl and you haven't met her before and let's say a girl talks to a guy then it's instantly thought of as they are coming on to you or hitting on you and if you don't put up a friend barrier then it's a lot harder to make friends with the other gender because they think you are trying to hit on them or trying to get with them or something, I kind of think that is a little messed up.
>
> -Rex, (E-HCP)

Eunice (U-LCP), saw it similarly,

> I guess it depends if you're flirting with somebody. You know, if you're girl you want to show that feminine side that sexy side and if you're a guy you want to show that macho side of themselves to get the girls attention. If you're into a person you want to show that side of you.
>
> -Eunice, (U-LCP)

Like Eunice, Lars (A-LCP), also saw masculinity and femininity being demonstrated through the prism of interpersonal relationships:

> Dating, I think women are more passive then men are. Men are a little more aggressive then women are. Generally speaking. Women are still the passive gender for the most part in dating. People say that women are kind of aggressive with guys, but I haven't seen that, I am sure it happens but I haven't seen it.
>
> - Lars, U-LCP

Pablo (A-HCP), saw it broader terms and more contingent on social context. His response to the question of how gender role personality traits affects the way people interact was:

> I think it affects it a lot like it social roles. You notice the difference. I used to be in the military before and you notice it there. The more masculine an organization, the more everyone else is going to be [masculine]. It alters the way some of the women act. Just some of the things they would say… it is not naturally what an average lady would say. They have been around so many men that are kind of vulgar to try to fit in. Also vice-versa…
>
> -Pablo, A-HCP

The themes associated with this set of questions are that most of the respondents did not see their own behavior as controlled by gender role personality traitss. They did however, recognize masculine and feminine behaviors and could clearly see them expressed in others. They could also recognize when they engaged in opposite gender role behaviors. This all seems to be their choice and they do not seem to be limited by their gender role behavior choices.

The final set of interview questions (Table 13) had participants examine the relationship between gender role personality traits and the use of computers. Surprisingly, most participants had actually thought about this relationship prior to this

study. When asked if they had thought about how masculinity and femininity was related to the use of computers most said, “Yes. “

Table 13: Questions related to Gender Role Personality Traits and Computer Use

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4). Prior to this study did you ever think about how masculinity or femininity related to the use of computers?

a. Are there ways in which you use the computer that you think might be tied to masculinity or femininity?
b. Are there ways in which you think masculinity or femininity affects the ways others use computers?
c. Do you think of computers as a masculine, feminine or neutral activity? What makes you think so?
d. Can you think of ways in which being one gender has an advantage of the other when it comes to computers?
e. Can you describe how you use a computer in your daily life?
f. Can you describe your thoughts or feelings about using computers?
g. Can you list some benefits of using computers?
h. Can you list some problems with the use of computers?
i. Do you have any other thoughts on using computers or masculinity and femininity?

This was best expressed by Rex (E-HCP),

> I feel like it's a more masculine thing even though now days everyone uses computer but I feel like masculine uses computer more for enjoyment where feminine might not kind of use it for work or for surfing the web, which could also be enjoyment but I am talking about masculine like video games or looking up stuff. Like my mom uses it for work and looks up news and stuff and really doesn't do anything all that fun on it. I don't think, she might. She has a lot of other stuff for fun...The difference between masculine or feminine with computer is how they use it versus whether or not it is a masculine or feminine thing, it's just how they want to use it for fun.
>
> -Rex, E-HCP

Dudley (U-LCP) seemed to focus more on gender than on gender role personality traits of masculinity and femininity

> You know I did. Let me tell you why, because at work I see the way men and women use computers and I often noticed it… What I have noticed is that how they kill spare time at work. Women will frequently shop and spend a lot time on their Facebook… I am not sure if guys do that, too… They sort of browse the Internet like they browse a magazine. Sort of...And they communicate, write e-mails, instant message. I don't tend to do that. That seems to be what goes down. They will sit at their desk and kind of browse. I tend to get up. That may be a difference in work style now that I think about it. But I notice that women do different things with the computer, mainly shopping. Women will shop more. I don't see the men shopping at all.
>
> -Dudley, U-LCP

Pablo (A-HCP), once again, related the differences to his military experience,

> Somewhat, I did because that is what I did. In the military I was a network system administrator and like I used to fix computers. Yeah, I would notice that when we went to school that a bunch of the women didn't make it. It was a lot harder for them. They would get the book stuff and know definitions and stuff but when it came to actually working on a computer and fixing some kind of system error they couldn't do it. There were more males in the military… The females that they did have in there, … when they had a big system error that they knew not to send a woman. Even the boss knew, it wouldn't have to be a male to know that you didn't send a woman to work on the error.
>
> -Pablo, A-HCP

Fanny, (A-HCP) described her experience in observing children in a school setting,

> "Yeah, because I watch the students when we are in the computer lab, when there are certain math tests that they are suppose to do, we have to tell them to get off the computer. The girls will play the Brats and Barbie games and boys play the more masculine games…"
>
> -Fanny, A-HCP

Even when they did not think about the relationship between gender role personality traits and computers prior to the study, most could clearly point to ways in which their own use was gender related as Tim (I-HCP) put it, "I know that my wife is not going to do a search on Youtube for amazing car chases whereas, I am. Or the best 100 goals for world cup soccer, I am going to look for that but she won't…"

Tiffany (I-LCP) also clearly saw her use of the computer as linked to femininity,

> I would have to say it is tied to femininity because the things I look at are the gossip web site and saving money and things to do with the family and things like that, my husband is looking and sports and sports news and weather channel and things like that. I would say for me I wouldn't see any of the males that I know looking at the same thing that I do. I would have to say that it leans more toward femininity.
>
> -Tiffany, I-LCP

Sara, (E-HCP) saw her use as more associated with communication and contrasted that with males search for information, "I guess like goes more on Myspace and contact family and friends. Guys are more like jobs and I don't know." Laura (E-LCP) answered similarly, "Maybe femininity, I think that Myspace and looking at pictures and talking to your friends is more of a feminine thing…" While he did not see his use as gender role personality traits related, Sam (A-HCP) did recognize it in his wife's use,

> Myself, in particular no… But I can think things that would be more feminine. I know my wife is a knitter she will do a lot of yarn shopping and research all these different kinds of yarn on the internet and I can't think that I or any other guy I know would do that. I do know male knitters that do the same amount of yarn shopping that she does but I only see her do that.
>
> -Sam, A-HCP

Dudley (U-LCP), whose PAQ scores showed him to be undifferentiated, did not see things as clearly cut along gender lines,

> It maybe that there are surveys that completely disprove what I am saying. One thing that I hear is that women are the biggest gamers now on computers and I don't do any games and we typically think of that as a masculine thing. 15-year old kids and 30-year old men alike on the computer till dawn playing video games...I have never been that way. It has just become so crazy the way that computers alter…they don't seem to adhere to gender roles.
>
> -Dudley, U-LCP

While we might expect that undifferentiated and androgynous individuals would respond differently, due to the quantitative results and because they are on opposite ends of the gender role personality spectrum, once again we have one of the androgynous respondents replying more like the undifferentiated. Sam (A-HCP), offered a response similar to Dudley (U-LCP). When asked if he could think of ways that masculinity or femininity affected the ways others used computers Sam's (A-HCP), response was,

> If I thought about using the computer for pornographic purposes I would think of that as a strongly masculine...Other then that I can't think of how anybody else could use the computer and think of it has masculine or feminine. If you ask me I wouldn't say like myself. I would see it as something both sexes do. But if you ask me to assign it I would probably say masculine. Having played games for so long I see more men playing then women. There are women gamers. My wife does play video games with me and my brother. Having played online games and massive multi-player games with voice chat and coordination I would say the proportions of men to women are large … There are very few women players. I played World of Warcraft and in our guild of about 80 constantly active members, … of them there were 3 or 4 women and my wife being one of them.
> The SIMS [virtual reality game], I think, I consider that I think a lot of women like that because my wife makes the houses. She just designs the house and gives herself infinite money and not really play the game.
>
> -Sam, A-HCP

So the theme we see here is that the qualitative data indicate that the participants clearly recognized masculine and feminine uses of the computer. Even though the respondents

could clearly identify ways in which there were masculine and feminine uses of the computer, when asked if computers were a masculine, feminine or neutral activity, all said neutral. This seems to suggest that although the respondents saw the use of computers in general as neutral, they are able to categorize specific uses into gender role behaviors. In addition, when asked if either gender has an advantage when it comes to computers most said, no. When asked if either gender had an advantage when it comes to computers, most answered like Fanny (A-HCP) who said, "I don't think so. I don't see my gender having an advantage." While none said women have an advantage, some respondents said that males have an advantage.

Lars, (U-LCP) for example said,

> This isn't going to go over but, this is really sexist but I believe that men biologically have a better mind for computers because of they're spatial, because of their biological spatial math reasoning ability, that's not gonna' go over, that's gonna' offend a lot of people to say that. Just like women have an advantage with understanding facial expression and connecting emotionally with children and other compared to me, that's the difference… There are some things that we can't voice in our culture because we get in trouble.
>
> -Lars, U-LCP

These sentiments were echoed by Eunice (E-LCP) who said,

> I guess guys know more about computers. I know if I ever have anything wrong with mine I can call my cousin and he is like a computer nerd, he can take all the bugs out so I am guessing guys are more intelligent about computer then females are.
>
> -Eunice, E-LCP

In summary, themes from this part of the study, suggest that people do recognize that there are different ways in which masculine and feminine people use computers but both can use them for what they need to get done. Overall they see the use of computers as

neutral but if one gender did have an advantage, a few would suggest that it was the males.

Summary

The results of the quantitative analysis indicated that there are differences in computer playfulness depending on the context of its use. People tend to be most playful when using a computer at home. They are also more playful in general, when using a computer, than when using a computer for school or work and least playful when using the computer for work. However, it is likely that the higher incidence of computer playfulness at home is the major contributing factor to the difference observed between computer playfulness in general and CP in work and school. Further analysis showed that those who are androgynous (scoring high on both instrumentality and expressiveness) are more playful than those who are undifferentiated (scoring low on both instrumentality and expressiveness). Finally, males tended to be more playful when using a computer than females.

From the qualitative analysis, out of the four groupings of questions several themes emerged. We find that men tended to have more leisure time than women did and women, regardless of their gender role personality traits, tended to have nurturing responsibilities that took up their time. Males also tended to do the things they wanted to do even if they had family obligations and the females spoke more of obligations and

wanting to do things outside of the house if they had the time. Although with this, there was a mixed response on whether using a computer was joy or a chore, the sentiment pretty much fell along computer playfulness lines. All participants relied heavily on the computer for work and most considered their home time use of the computer to be leisure. Participants could clearly identify gender role behaviors in themselves and others. However, they did not feel constrained by gender role-linked behaviors. That is to say, they often could identify gender role behaviors they engaged in but did not identify gender role behaviors that they avoided. They consider the activities chosen to be their free choice. Finally, the link between gender role personality traits and computer use was seen in how respondents perceived the way the computer is used. Specifically, participants noted that computer-using behavior such as shopping, communication and social networking seemed to be a feminine related computer use while information, game-playing, sports and pornography were perceived masculine uses. The underlying theme seems to be that differences between sexes in computer use that emerged from the study are primarily differences in leisure time use.

Chapter 5 : Discussion, Recommendations and Limitations

This research began because of the concern about gender differences in computer use. The present concern was due not to issues of access to computers or even computer use but due, in part, to the interpretation of that use. The cause for concern was over the number of women that were changing their majors or dropping out of competitive computer engineering programs despite their success in the classroom (Margolis, et al., 1999). So while women could do the work for the class, their out of class use of computers and their attitude toward computers differed from the males in the program. When interviewed, the women remarked about how the males seemed to spend every waking hour doing computer related things like programming or building robots. For their part, the women wanted to spend their free time doing other things like photography, reading or hanging out with friends. This led the women to feel like maybe they did not belong in the computer engineering program because they did not "…dream in code…" like their male counter parts (Margolis, et al., 1999). Since some women who persisted in the program shared the same attitudes toward computers that the males did, it was reasoned that possibly some factor other than biological sex but still related to biological sex, might be responsible for the difference in attitudes between men and women toward leisure time use of computers. Gender role personality traits were chosen as a related construct. Gender role personality traits are defined as the degree to which individuals agree with stereotypic gender descriptors as applying to themselves. In particular, this study used the Personal Attributes Questionnaire (PAQ) to ascertain

gender role personality traits. Participants who take the PAQ are given a score on the instrumental (masculine) and the expressive (feminine) score. The relationship between these scores determines the individual's gender role personality traits. Those who score high on the instrumentality scale and low on the expressive scale are considered to be *instrumental*. Those who score high on the expressive scale and low on the instrumental scale are considered to be *expressive*. Those who score high on both scales are considered to be *androgynous* while those who score low on both scales are considered to be *undifferentiated* (Spence, et al., 1974).

To investigate the relationship between gender role personality traits and computer use, another construct called microcomputer playfulness or more simply, computer playfulness was selected. Computer playfulness is "the tendency to be spontaneous, inventive and imaginative when interacting with a personal computer" (Webster and Martocchio, 1992). The focus of this study was investigating the differences in sex and gender role personality traits as related to computer playfulness. Prior studies (Webster and Martocchio, 1992; Yager, et al, 1997; Woszczynski, 2000, 2002) found that computer playfulness could be a trait or a state. This means one could be computer playful in general or whenever they interact with a computer or they could be playful only when engaged in certain computer activities such as designing a webpage or playing games. For this study, participants were asked about their computer playfulness in general (CP-G) and were also asked about their computer playfulness at work (CP-W), at school (CP-S) and at home (CP-H). It was found that participants were more playful when using a computer at home (CP-H) than they were in any other setting.

This was found for both males and females and across all four gender-role types. The analysis further showed that computer playfulness in general (CP-G) was greater than computer playfulness at school (CP-S) and computer playfulness at school (CP-S) was greater than computer playfulness at work (CP-W). It is understandable that computer playfulness at home (CP-H) would be highest because that is when people are using the computer for leisure use and not for homework as directed by a professor or for work related activities directed by a boss. Further, participants indicated that when they considered computer playfulness in general (CP-G) they included work and school uses of the computer while they only counted personal use when considering using the computer at home. So computer playfulness in general (CP-G) is comprised of all three (CP-H, CP-S and CP-W). The presence of CP-H within CP-G is most likely what is responsible for elevating CP-G over CP-S and CP-W. This study then, showed computer playfulness to be highly state dependent. It is the setting in which the computer is used that seems to make participants more or less playful when using a computer. Computer playfulness, as a state, had previously been associated with the concept of flow (Csikszentmihalyi 1990; Trevino and Webster 1992; Webster, Trevino and Ryan 1993; Woszczynski, 2000, 2002). Csikszentmihalyi (1990) defines the state of flow as "being completely involved in an activity for its own sake." However, the present study found computer playfulness can also be a state contingent upon the setting that one uses a computer. Each setting carries with it a context of computer use and the activities one engages when using the computer. For the participants in this study, it appears that the context of work makes the interaction with computers less playful than the context of

using the computer for school which in turn, has a context that makes it less playful than when using a computer at home. This is an extension of the prior literature and consistent with other studies in that it highlights one of the instances of how computer playfulness can be viewed as a state. Specifically, this study indicates that the level of computer playfulness can vary based on the setting and context. This broadens the area of investigation of computer playfulness as a state in relation to setting or context as well as to the state of flow.

This study also had some interesting results concerning instrumentality and computer playfulness. A finding of this study was that those who scored in the androgynous range of the PAQ (scoring high on both the instrumental and expressive scales) where more playful than those who scored in the undifferentiated range (scoring low on both the instrumental and expressive scales). Although failing to reach a level of significance, it is interesting to note that those who scored in the instrumental range (high on instrumentality and low on expressiveness) also scored higher on computer playfulness than those who scored in the undifferentiated range. One possible explanation for this may be related to the characteristics of androgynous individuals and individuals who score in the undifferentiated range. Hoffman and Fidell (1979) found that those who score in the undifferentiated range tend to be more introverted, have higher external locus of control, a greater dislike for work and lower self-esteem than those who were androgynous. While those who scored in the androgynous range tended to be more extroverted, have higher internal locus of control, a greater liking of work and higher self-esteem than those who were undifferentiated. Self-efficacy and internal locus of

control have previously been associated with higher levels of computer playfulness (Venkatesh, 2000). So those whose PAQ scores placed them in the undifferentiated category would likely be lower in self-efficacy and internal locus of control and, similarly, lower in computer playfulness. Since those who are androgynous also tend to be higher in self-efficacy and higher in internal locus of control, they would also tend to be higher in computer playfulness. However, the presence of the expressive qualities may also contribute to a higher level of computer playfulness. In addition, the results of the study suggest that low levels of both instrumentality and expressiveness are related to low levels of playfulness with a computer. This underscores the clear differences in computer playfulness between those who score in the androgynous range and those who score in the undifferentiated range

The third result of the quantitative analysis was the finding that males score higher in computer playfulness than females. Prior studies (Webster and Martocchio, 1992) found no differences between the sexes on the measure of computer playfulness when they controlled for computer experience. The present study made no effort to control for computer experience. It is possible that controlling for computer experience might have eliminated differences in this case but this doubtful for several reasons. At the time of the original Webster and Martocchio studies (1992), lack of equal access to computers was a significant issue. Since then, not only has access to computers exponentially increased, but the types of things computers are used for have greatly changed. When the validating studies for computer playfulness were done less than 3% of the U.S. population had been on the World Wide Web and even two years later, fewer

than 3% of U.S. schools were wired for the Internet (DiMaggio and Hargittai, 2001). Currently 73% of the U.S. population report using the Internet and 55% have broadband in the home (Horrigan, 2008). There has also been a significant shift during this time period in relation to gender access to the Internet. In the early 90's it is estimated that between 85 and 90% of those on the internet were males (Taylor, et al., 1993). More recently, it has been noted that women use the internet slightly more than men (Fallows, 2005). So access to computers and the internet, as well as women's parity of computer use have dramatically changed since the original computer playfulness studies. However, as this study shows there remain differences between males and females when it comes to computers, although these differences might be influenced by other factors in individuals' lives. This is particularly highlighted by the results of the qualitative part of this study. Twelve individuals (six males and six females) whose scores placed them into the four PAQ categories and as well as those who were high in computer playfulness and those who were low in computer playfulness were chosen to be interviewed. The participants were asked about their availability and use of leisure time, their perceptions of gender role personality traits, their use and their perception of others use of computers and about their perceptions of the relationship between gender role personality traits and computers. When asked about their leisure time, all of the women, regardless of PAQ category or level of playfulness indicated a lack of leisure time and a responsibility of caring for others. Some of the women indicated that they had no leisure time at all. The women also indicated that if they had more leisure time they would spend it on social activities outside of the home. All of the males were able to identify leisure time. Even when they

had nurturing responsibilities of children, family members or pets, they still found time for their leisure activities. These activities were sometimes social, like playing in a band or volunteering to work with a recovery group but just as often they were individual or solitary and involved the computer, like editing video or digital music. So one of the possible influences on the difference in computer playfulness between men and women could be availability of time to engage in computer playful activities and the choice of activities men and women chose to engage in when they have free time. This mirrors the sentiments of the students at Carnegie-Mellon University who Margolis and Fischer (2000) interviewed. In their interviews female computer engineering students talked about doing non-computer related things with their free time while the male computer engineering students focused their free time on coding or building robots.

When asked about their tendency to act in an individualistic agentic (masculine) manner or their tendency to act out of their connectedness to others (feminine), participants' answers closely matched their PAQ category. Bem (1993) noted that those who score high on either of the gender scales tend to see the world more through their gendered experiences while those who score low on the scales tend not to. This was shown in the current study by the responses of the undifferentiated male who had great difficulty in describing his behavior in gender terms and the androgynous male who clearly recognized when he was exhibiting masculine behaviors and when he was exhibiting feminine behaviors. When asked more directly using the terms *masculine* and *feminine*, most of the participants could clearly identify masculine and feminine behaviors that they and others engaged in. However, they had difficulty identifying

masculine or feminine behaviors that they avoided. Only the highly expressive female was able to clearly identify behaviors that she considered masculine and deliberately avoided. The others did not see masculine or feminine gender role personality traitss as limiting in anyway the choices that they make or the behaviors they engaged in. This is not to say they did not recognize the behaviors, they just felt that they had the freedom to make the choices to do the things they wanted to. Examples of this were shown when they could clearly identify when they engaged in behaviors inconsistent with their gender role personality traits. That is males were easily able to identify when they engaged in feminine behaviors like wearing mascara, sewing garments or baby-sitting and females were able to identify when they engaged in masculine behaviors such as heavily lifting or construction work. Additionally, participants were clearly able to identify gender role behavior and how it plays out in interpersonal relationships. Several respondents remarked how differently they and others behave when they are romantically interested in another person and when they just want to be friends. It seems at times when there is a romantic interest, according to these participants, individuals become more extreme in their feminine or masculine identity. The females tended to take on more stereotypic gender role behaviors of passivity and submissiveness while the male exhibited more stereotypic roles of dominance, competitiveness and aggressiveness when trying to impress a potential mate. So participants were well aware of gender role behaviors and could clearly identify behaviors that they considered to be masculine or feminine but for the most part seemed to find the roles as useful but not limiting.

Although the term *computer playfulness* was unknown to most participants prior

to this study, participants could easily identify times when they had been playful while using a computer. Surprisingly, both the undifferentiated male and the androgynous female had considered themselves not to be playful when using a computer. Based upon the quantitative results we would have expected them to be opposite on this measure. This however, points out the multifaceted aspects of individuals. On the one scale, gender role personality traits, we would expect them to have different perceptions because their gender role personality traits were on opposite ends of the continuum when it comes to computer playfulness. On the other hand, the androgynous participant is female and one finding of the present study is that females tended to be lower than males in computer playfulness. The above suggests that the variables related to computer playfulness are complex and will require further research.

Most of the other responses about computer playfulness tended to fall in line with PAQ category and computer playfulness levels. Those high in playfulness considered using the computer more of a joy than a chore while those lower playfulness tended to see using the computer as more of chore. Even when the computer was considered a chore, however, most participants indicated they could not maintain their normal lives without it. Almost all of the participants said that work would come to a halt if they could not use the computer at their jobs. Others indicated that lack of use at home would be distressing, particularly if they had a paper due for school. Regardless of their gender role personality traits or level of computer playfulness participants indicated that the computer has become a major fixture in their lives that they have come to depend upon both at work and in the home.

Finally, participants were asked about gender role personality traits and computers. Most could point out clear examples of how gender or gender role-linked behaviors shaped their own or others use of the computer. These descriptions tended to be of leisure time use of the computers. When the undifferentiated male talks about differences in his co-worker's use of the computer, he is not referring to on the job tasks but specifically points to "when they want to kill time…" When describing gender differences in children's use once again, the high computer playfulness female talks about when they are finished with their math work and describes the different game-type activities the children engage in. Another participant contrasts his leisure time use of searching for videos of soccer games and searching for sports scores with his wife's use of social networks and communication programs like email and instant messaging.

In summary, the results of the interviews support the view that men and women do differ in their use of the computer but that difference in use may be largely related to leisure time use. Women in the study tended toward using the computer for more social activities such as social networks, emailing and blogging. While men tended to use the computer more for entertainment, information seeking and game playing. This is consistent with prior research (Fallows, 2004; Sherman, et al., 2000) that showed that men and women use the Internet equally but often use it for different things. In addition, it must be noted that many of the more popular uses of social media, on-demand video, and instant blogging (Twitter) are all recent phenomena and were not around 5 years ago. So, as the types of interactions that are available on the new generation of digital devices and applications change, we need to investigate the potential impact of those changes on

the relation of computer playfulness to gender and gender role personality traits.

Recommendations

This study started as an investigation of the differences in computer use between males and females. The biggest differences that were noted in this study turned out to be in leisure time use of computers. Further study needs to be done to see if there are differences in computer playfulness specifically when using the computer for non-leisure time activities such as work place tasks. In addition, future research is needed to explore potential differences in computer playfulness when only looking at school related tasks and context.

As computer use has changed since the original studies of computer playfulness, so have the types of digital devices changed during this period. We now have a wide array of new digital devices that include many of the capabilities and affordances of what were limited to computers in the past. For example, the new generation of "smart phones" such as the Blackberry, G1 Android, the Palm Pre and the iPhone, as well counter top appliances, and electronic tablets provide many of the functions and affordances of a computer. Understanding the types of use of these digital devices in different contexts by gender and gender role personality traits and their relationship to computer playfulness will continue to be an important focus of future research.

The relationship between expressiveness and computer playfulness needs to be further investigated. Since it was the presence of expressiveness along with instrumentality that seemed to make the difference in this study, the particular qualities of expressiveness as well as the particular qualities of instrumentality that are more aligned

with computer playfulness need to be explored. Finally, this research involved community college students, a population that represents a demographically and educationally diverse sample. Replicating the study with more specific populations such as those enrolled in competitive computer science programs or with other populations such as students in four-year universities or those employed in the computer industry might yield interesting results.

Limitations

The limitations of this study include the use of self-report instruments rather than direct observation of actual computer use. There may have also been some confusion on the participant's part due to the wording in the directions on how to complete the Computer Playfulness Scale. More care needs to be given in making the directions clear and unambiguous. Due to the nature of the study it would have been difficult, at best, to obtain as many responses and to observe actual computer use in the various settings. Further, an attempt to observe subjects leisure time use of computers in the home would not only have been logistically difficult but would also have been intrusive and have possible reactive effects that would confound authentic leisure-time use of computers in the home.

The results of this study are also limited to community college populations with similar demographics as the present study. In addition, based on these results of the study, the survey instrument might be revised, refined and distributed to a larger sample to see how widely these types of experiences are shared.

Appendix A: Cover Letter

Cover Letter
Instrumentality and Microcomputer Playfulness

You are invited to participate in a study of gender role personality traits and computer use. My name is Herb Coleman and I am a graduate student at The University of Texas, enrolled in the Instructional Technology Program. This study is part of the process to fulfill requirements for the Ph.D. I hope to discover if there is a relationship between gender role personality traits and a concept called microcomputer playfulness. Microcomputer playfulness is characterized by cognitive, physical and social spontaneity, as well as manifest joy and sense of humor when interacting with a microcomputer or personal computer. You have been selected as a possible participant in this study because you are enrolled in a general education course and thus represent a typical Austin Community College student. You will be one of between 250 and 300 participants chosen for this study.

If you decide to participate, you will be asked to fill out a survey comprised of basic demographic data, computer use and experience, and modified versions of the Computer Playfulness scale and the Personal Attributes Questionnaire (PAQ). The survey should take about 10-15 minutes to fill out. There will be no personally identifiable information gathered. Each survey is numbered so that we can ensure that we account for all of the surveys and to aid in data entry procedures. In addition, you may use the survey number to request your individual results on the two instruments.

Your decision to participate will not affect your future relations with Austin Community College or the University of Texas. If you choose to participate, you are free to discontinue participation at any time.

You are making a decision whether to participate or not. Your completion of this survey indicates that you have read the information provided above and have decided to participate. You may withdraw at any time after beginning the survey, should you chose to discontinue participation in this study. If at anytime during the completion or after of the survey you wish to withdraw from the study you may do so by writing "I wish to withdraw from this study" on the form. You may also withdraw from the study after completing the study by noting the survey number on top of the form and contacting me by telephone (512-223-7746) or sending an email stating your request to not have your responses included in the study to hcoleman@ausitncc.edu.

If you have any questions, feel free to ask me. If you have additional questions later, my faculty sponsor, Paul Resta, Ph.D. (512-471-4014, resta@mail.utexas.edu) or I (512-223-7746, hcoleman@ausitncc.edu) will be happy to answer them.

_____	_____	_____
Please print your name here	Initial here if and if you are willing to be interviewed for this study	enter your phone number

_____	_____
Signature	Date

Appendix B: Survey Instrument

Survey #_____
If you would like to know the results of your individual survey, please copy down the survey # and e-mail your request to hcoleman@austincc.edu

Age _____ Race/Ethnicity _____African-American (Black)
_____Asian-American
_____European-American (White)
_____Hispanic, Latino
_____Native American (American Indian)
_____International -country of origin_____
_____other_____

Sex ____Male ____Female

Major_____

Academic Classification:
Freshman (0-30 hrs)_____ Sophomore (31-60 hrs) _____ Jr. (61-90 hrs) _____ Sr. (90 + hrs) _____
Graduate _____
Computer Use: Average number of TOTAL hours of computer use a week

less than 5 hours ____ 6-10 hours _____ 11-15 _____ 16-20_____ more than 20_____

****

The items below inquire about what kind of person you think you are **IN GENERAL**. You are to choose a letter which describes where you fall on the scale. For example, if you think you have no artistic ability, you would choose A. If you think your art skills are fairly good, you might choose E. If you are only medium, you might choose C, and so forth.

1.	Not at all aggressive	A...B...C...D...E	Very aggressive
2.	Not at all Independent	A...B...C...D...E	Very independent
3.	Not at all emotional	A...B...C...D...E	Very emotional
4.	Very submissive	A...B...C...D...E	Very dominant
5.	Not at all excitable in a major crisis	A...B...C...D...E	Very excitable in a major crisis
6.	Very passive	A...B...C...D...E	Very active
7.	Not able to devote self completely to others	A...B...C...D...E	Able to devote self completely to others
8.	Very rough	A...B...C...D...E	Very gentle
9.	Not at all helpful to others	A...B...C...D...E	Very helpful to others
10.	Not at all competitive	A...B...C...D...E	Very competitive
11.	Very home oriented	A...B...C...D...E	Very worldly
12.	Not at all kind	A...B...C...D...E	Very kind
13.	Indifferent to others approval	A...B...C...D...E	Highly needful of others approval
14.	Feelings not easily hurt	A...B...C...D...E	Feelings easily hurt
15.	Not at all aware of feelings of others	A...B...C...D...E	Very aware of feelings of others
16.	Can make decisions easily	A...B...C...D...E	Has difficulty making decisions
17.	Gives up very easily	A...B...C...D...E	Never gives up easily
18.	Never cries	A...B...C...D...E	Cries very easily
19.	Not at all self-confident	A...B...C...D...E	Very self-confident
20.	Feels very inferior	A...B...C...D...E	Feels superior
21.	Not at all understanding of others	A...B...C...D...E	Very understanding of others
22.	Very cold in relations with others	A...B...C...D...E	Very warm in relations with others
23.	Very little time for security	A...B...C...D...E	Very strong need for security
24.	Goes to pieces under pressure	A...B...C...D...E	Stands up well under pressure

The following questions ask you how you would characterize yourself **WHEN USING A PERSONAL OR MICROCOMPUTER**. For each adjective below, please rate yourself from 1 to 7 with a score of 1 meaning "never or almost never like me" and 7 meaning "always or almost always like me" when you interact with a personal or microcomputer:

	Strongly Disagree	Disagree	Slightly Disagree	Neither Agree nor disagree	Slightly Agree	Agree	Strongly Agree
Spontaneous	1	2	3	4	5	6	7
Unimaginative	1	2	3	4	5	6	7
Flexible	1	2	3	4	5	6	7
Creative	1	2	3	4	5	6	7
Playful	1	2	3	4	5	6	7
Unoriginal	1	2	3	4	5	6	7
Uninventive	1	2	3	4	5	6	7

The following questions ask you how you would characterize yourself when using a personal or microcomputer **IN YOUR PLACE OF WORK**. For each adjective below, please rate yourself from 1 to 7 with a score of 1 meaning "never or almost never like me" and 7 meaning "always or almost always like me" when you interact with a personal or microcomputer:

	Strongly Disagree	Disagree	Slightly Disagree	Neither Agree nor disagree	Slightly Agree	Agree	Strongly Agree
Spontaneous	1	2	3	4	5	6	7
Unimaginative	1	2	3	4	5	6	7
Flexible	1	2	3	4	5	6	7
Creative	1	2	3	4	5	6	7
Playful	1	2	3	4	5	6	7
Unoriginal	1	2	3	4	5	6	7
Uninventive	1	2	3	4	5	6	7

The following questions ask you how you would characterize yourself when using a personal or microcomputer **FOR SCHOOL WORK OR EDUCATIONAL PURPOSES**. For each adjective below, please rate yourself from 1 to 7 with a score of 1 meaning "never or almost never like me" and 7 meaning "always or almost always like me" when you interact with a personal or microcomputer:

	Strongly Disagree	Disagree	Slightly Disagree	Neither Agree nor disagree	Slightly Agree	Agree	Strongly Agree
Spontaneous	1	2	3	4	5	6	7
Unimaginative	1	2	3	4	5	6	7
Flexible	1	2	3	4	5	6	7
Creative	1	2	3	4	5	6	7
Playful	1	2	3	4	5	6	7
Unoriginal	1	2	3	4	5	6	7
Uninventive	1	2	3	4	5	6	7

The following questions ask you how you would characterize yourself when using a personal or microcomputer **AT HOME**. For each adjective below, please rate yourself from 1 to 7 with a score of 1 meaning "never or almost never like me" and 7 meaning "always or almost always like me" when you interact with a personal or microcomputer:

	Strongly Disagree	Disagree	Slightly Disagree	Neither Agree nor disagree	Slightly Agree	Agree	Strongly Agree
Spontaneous	1	2	3	4	5	6	7
Unimaginative	1	2	3	4	5	6	7
Flexible	1	2	3	4	5	6	7
Creative	1	2	3	4	5	6	7
Playful	1	2	3	4	5	6	7
Unoriginal	1	2	3	4	5	6	7
Uninventive	1	2	3	4	5	6	7

Appendix C: Interview Questions

Questions for Qualitative interviews

The following questions will be used to find out how individuals in the various categories describe their interaction with computers and how they see themselves through gender role personality traitss. These are the prime or starter questions. Follow up questions may be asked dependent upon the participant's answers. These may include asking them to elaborate or define terms or to explain it in another way.

1). Could you please describe your after work/school responsibilities at home (caring for children, other family members, domestic duties, 2nd job, hobbies, volunteer activities, etc).

a. What activities would you most likely engage in if you didn't have this primary responsibility?
b. How much leisure time (time to do things you want rather than have to do) would you say you have in a given week?
c. What activities do you engage in during your leisure time?
d. Do you consider your use of the computer outside of work and school to be leisure or would you characterize it differently?

2). Prior to participating in this study, did you tend to see yourself as computer playful?

a). Can you describe what is usually going through your mind as you are using a computer?

b). Can you describe how you think or how you feel when doing different tasks in the computer.

c). Would you describe your experience when using a computer as more of chore or more of a joy?

d). How would you feel if you came into work or school tomorrow and were unable to use a computer?

e). What is the longest that you have gone without using a computer?

f). For what kinds of things do you use a computer in your leisure time?

g). How would you feel if today, you went home and were unable to use a computer for the rest of the day? What if you were unable to use it for the rest of the week?

3). Prior participating in this study, did you tend to think about how being independent or connected to others affected your actions?

a). In what ways does this affects your behavior now?

b). What are some activities or behaviors that you engage in that you see as linked to masculinity or femininity?

c). What are some activities or behaviors that you avoid that you see as linked to masculinity or femininity?

d). Do you think that you tend to place more importance on what is you do or how what you do affects others?

e). Describe how that affects your behavior.
f). Can you give an example when you've acted in a manner or took part in activities that were opposite of your masculinity or femininity?
g). How significant do you think masculinity or femininity is in affecting what people do?
h). How significant do you think masculinity or femininity is in affect how people interact?

4). Prior to this study did you ever think about how masculinity or femininity related to the use of computers?

a). Are there ways in which you use the computer that you think might be tied to masculinity or femininity?
b). Are there ways in which you think masculinity or femininity affects the ways others use computers?
c). Do you think of computers as a masculine, feminine or neutral activity? What makes you think so?
d). Can you think of ways in which being one gender has an advantage of the other when it comes to computers?
e). Can you describe how you use a computer in your daily life?
f). Can you describe your thoughts or feelings about using computers?
g). Can you list some benefits of using computers?
h). Can you list some problems with the use of computers?
i). Do you have any other thoughts on using computers or masculinity and femininity?

References

ACITS (1997) Repeated Measures ANOVA Using SAS PROC GLM, The University of Texas at Austin Statistical Services Retrieved April 17, 2007 http://www.utexas.edu/cc/docs/stat40.html

American Association of Community Colleges [AACC]. (2000). Community college facts book. Washington, DC: Author.

Anderson, M., & Hornby, P. (1996). Symposium: Computer attitudes and the use of computers in psychology courses. Behavior Research Methods, Instruments, & Computers, 28, 341-346.

Ayersman, D. (1996). Effects of computer instruction, learning style, gender, and experience on computer anxiety. Computers in the Schools, 12(4), 15-30.

Bailey, J. E. and S. W. Pearson, (1983) Development of a Tool for measuring and analyzing computer user satisfaction, Management Science, Vol. 29, No.5, pp. 530-545.

Bandura, A., and Adams, N. E. (1977). Analysis of self-efficacy theory of behavioral change. Cognitive Therapy and Research, 1, 287–310.

Bem, S. L. (1974). The measurement of psychological androgyny. Journal of Consulting and Clinical Psychology. 42, 155-62.

Bem, S. L. (1977). On the Utility of Alternative Procedures for Assessing Psychological Androgyny. *Journal of Consulting and Clinical Psychology, **45,*** 196-205.

Bem, Sandra L. (1981). "Gender Schema Theory: A Cognitive Account of Sex Typing." *Psychological Review* 88: 354-364.

Bem, Sandra L. (1993). *The Lenses of Gender: Transforming the Debate on Sexual Inequality*.New Haven: Yale University Press.

Baroudi, J. J., M.H. Olson and B. Ives, (1986). An Empirical Study of the Impact of User Involvement on System Usage and Information Satisfaction," 29(3): 232-238.

Bozionelos, N. (2001). Computer anxiety: Relationship with computer experience and prevalence. Computers in Human Behavior 17: 213-224.

Brosnan, M. J. and M. J. Davidson. (1994). “Computer Phobia: Is It a Particularly Female Phenomenon?” The Psychologist 7: 73-78.

Coffin, R. J., and MacIntyre, P. D. (1999). Motivational Influences on Computer-related Affective States. Computers in Human Behavior, 15(5), 549-569.

Comber, C., and Colley, A. (1997). The effects of age, gender and computer experience upon computer attitudes. Educational Research, 39(2), 123.

Colley, A., and Comber, C. (2003, Summer). Age and gender differences in computer use and attitudes among secondary school students: what has changed?. Educational Research, 45(2), 155-165.

Colley, A. and Comber, C. (2003) School subject preferences: age and gender differences revisited. /Educational Studies /29:1, 59-67.

Compeau, D., and Higgins, C. (1995, June). Computer self-efficacy: Development of a measure and initial test. MIS Quarterly, 19(2), 189.

Compeau, D., and Higgins, C. A. (1999). Social cognitive theory and individual reactions to computing technology: A longitudinal study. MIS Quarterly,23(2), 145-159.

Cooper, J., & Weaver, K. D. (2003). Gender and computers: Understanding the digital divide. Mahwah, NJ: Lawrence Erlbaum Associates.

Csikszentmihalyi, Mihaly (1990). Flow: The Psychology of Optimal Experience. New York: Harper and Row.

Csikszentmihalyi, M., Creativity: Flow and the Psychology of Discovery and Invention. New York: Harper Collins. 1997.

Dambrot, F., Watkins-Malek, M., Silling, S., Marshall, R., and Garver, J. (1985). Correlates of sex differences in attitudes toward and involvement with computers. Journal of Vocational Behavior, 27, 71-86.

DiMaggio P, Hargittai E. (2001). From the 'Digital Divide' to digital inequality: Studying Internet Use as Penetration Increases. Work. Pap, Ctr. for Arts Cult. Policy Stud., Princeton Univ.

Dholakia, R., Dholakia, N. and Kshetri, N. (2003). Gender and Internet Usage. In Hossein Bidgoli (Ed), The Internet Encyclopedia, John Wiley & Sons, Inc.

Fallows, D. (2004) The Internet and daily life, Pew Internet & American Life Project, Jan. 2005. http://www.pewinternet.org/Reports/2005/Search-Engine-Users.aspx, accessed Jan.23, 2009

Felter, M. (1985). Sex Differences on the California Statewide Assessment of Computer Literacy. Sex Roles, 13, 181-192

Fennema, E., & Sherman, J. A. (1976). Fennema-Sherman mathematics attitude scales: Instruments designed to measure attitudes toward the learning of mathematics by females and males. Journal of Research in Mathematics Education, 12, 324-326.

Furger, R. (1998). Does Jane Compute?: Preserving Our Daughters' Place in the Cyber Revolution. New York, NY: Warner Books.

Gist, M. E. (1987). Self-efficacy: Implications for organizational behavior and human resource management. Academy of Management Review, 12(3), 472-485.

Hackbarth, G., Grover, V. & Yi, M. (2003). Computer playfulness and anxiety: Positive and negative mediators of the system experience effect on perceived ease of use. Information & Management, 40 (3),221-232

Hargittai, E., & Shafer, S. (2006, June). Differences in Actual and Perceived Online Skills: The Role of Gender. Social Science Quarterly, 87(2), 432-448.

Helmreich, R. L., Spence, J. **T.,** and Wilhelm, J. A. (1981). A Psychometric Analysis of the Personal Attributes Questionnaire. *Sex Roles, 7,* 1097-1108.

Hess, R. D., & Miura, I. T. (1985). Gender Differences in Enrollment in Computer Camps and Classes. Sex Roles, 13, 193-203.

Hoffman, D., & Fidell, L. (1979). Characteristics of Androgynous, Undifferentiated, Masculine, and Feminine Middle-Class Women. Sex Roles, *5,* 765-781.

Horrigan, J.B., (2008) Home Broadband Adoption 2008, Pew Project on the Internet and American Life, July, 2008. http://www.pewinternet.org/Reports/2008/Home-Broadband-2008.aspx, accessed Feb. 11, 2009

Howard, G.S. & Smith, R.D. (1986) Computer Anxiety in Management: Myth or Reality?, Communications of the ACM 29:611-615

Howell, A. W. (2000). A process model of learner behavior and engagement during web-based training. Thesis (Ph. D.)--Michigan State University. Dept. of Psychology, 2000.

Igbaria, M., Parasuraman, S., and Baroudi, J. J. 1996. A motivational model of microcomputer usage. J. Manage. Inf. Syst. 13, 1 (Jun. 1996), 127-143.

Ives, B., Olson M.H., and Baroudi J.J. (1983), "The Measurement of User Information Satisfaction," Communications of the ACM, Vol. 26, No. 10, pp. 785-793.

Kolb, D., (1985), LSI Learning-Style Inventory, McBer & Company, Training Resources Group, Boston, MA,

Konvalina, J., Wileman, S., & Stephens, L. (1983). Math proficiency: A key to success for computer science students. Communications of the ACM, 377-382.

Lenhart, A. and Madden, M. (2007) Social Networking Websites and Teens: An Overview. Retrieved Feb. 15, 2007 from http://www.pewinternet.org/pdfs/PIP_Teens_Privacy_SNS_Report_Final.pdf

Lieberman, J. N. (1977). Playfulness. Its relationship to imagination and creativity. New York: Harcourt Brace Jovanovich.

Lockheed, M. E. (1985). Women, girls and computers: A first look at the evidence. Sex Roles, 13, 115-122.

Lucas, H. C., Jr. (1978), Unsuccessful implementation: The case of a computer based order entry system. Decision Sciences, 9, 68-79.

Mandinach, E. B., & Corno, L. (1985). Cognitive engagement variations among students of different ability level and sex in a computer problem solving game. Sex Roles, 13, 241-250.

Margolis, J., Fisher, A., and Miller, F.(1999) "Caring About Connections: Gender and Computing," IEEE Technology and Society, December. Avaliable at www.cs.cmu.edu/~gendergap/papers.

Margolis, J., Fisher, A., and Miller F. (2000). Caring about Connections: Gender and computing. School of Computer Science, Carnegie Mellon University.

Margolis, J., and Fisher, A. (2002). Unlocking the Clubhouse Women in Computing. Cambridge, MA: The MIT Press.

Morawski, J. G. (1987). "The Troubled Quest for Masculinity, Femininity, and Androgyny." Pp.44-69 in Phillip Shaver and Clyde Hendrick (Eds.), *Sex and Gender*. Newbury Park: Sage.

Martocchio, J. J., and Webster, J. (1992). "Effects of Feedback and Cognitive Playfulness on Performance in Microcomputer Software Training," Personnel Psychology, Vol. 45, No. 2, 553-578.

Mauer, M. and Simonson, M. (1984). Development and validation of a measure of computer anxiety. In Proceedings of Selected Research Paper Presentations, M. Simonson (Ed.). The 1984 Convention of the Association for Educational Communications and Technology, Dallas, Texas, pp. 318-330. (ERIC Document Reproduction Service No. ED 243 428)

Miura, I. (1987). Mathematics achievement as a function of language. Journal of Educational Psychology, 79, 79-82.

Miura, I. T, & Hess, R. D. (1984). Enrollment difference in computer camps and summer classes. The Computing Teacher, 11, 22.

Multon, K. D., Brown, S. D., and Lent, R. W. (1991). Relation of self-efficacy beliefs to academic outcomes: A meta-analytic investigation. Journal of Counseling Psychology, 38, 30-38.

Newman, D., and Clure, G. (1984). Computer anxiety in elementary school children: The development of an instrument and its correlates. Paper presented at the meeting of the Rocky Mountain Research Association, Oklahoma City

Nickell, G., Schmidt, C., and Pinto, J. (1987). Gender and sex role preferences in computer attitudes and experience. Paper presented at the annual meeting of the Southwestern Psychological Association, New Orleans, LA.

Nunnally, J. C. (1978). *Psychometric Theory*. New York, NY: McGraw-Hill.

Ogletree, S., and Williams, S. (1990). Sex and sex-typing effects on Computer Attitudes and Aptitude. Sex Roles, 23, 703-712.

Potosky,D. (2002). A field study of computer self-efficacy beliefs as an outcome of training: the role of computer playfulness,computer knowledge,and performance during training. Computers in Human Behavior, 18(3),241–255

Raub, A.C. 1981, Correlates in computer anxiety and college students. Unpublished PhD. dissertation, University of Pennsylvania, Philadelphia, P A.

Robey, D. (1979), User Attitudes and MIS Use, Academy of Management Journal, 22(3), 527-538. 7

Sax, L.J. (2001). College Women Less Confident in Computing Abiltiy Than College Men. Research Alert, 19(2).

Sherman, R. C., A End, C., Kraan, E., Cole, A., Campbell, J., Birchmeier, Z., Klausner, J., (2000)The Internet Gender Gap Among College Students: Forgotten But Not Gone?, Cyber Psychology & Behavior, pp. 885-894., Vol 3, (5).

Stets, J. and Burke, P. (1996). "Gender, Control, and Interaction." *Social Psychology Quarterly* 59: 193-220.

Schmitt, N (1971) as referenced in Webster, J. and Martocchio, J., (1992), Microcomputer Playfulness: Development of a Measure with Workplace Implications, MIS Quarterly, 16(2) 201-226.

Spence, J. T., Helmreich, R., & Stapp, J. (1974). The Personal Attributes Questionnaire: A measure of sex role stereotypes and masculinity-femininity. Catalog of Selected Documents in Psychology, 4, 43-44.

Spence, J. T., and Helmreich, R. L. (1978). *Masculinity and Femininity: Their Psychological Dimensions, Correlates, and Antecedents.* Austin: University of Texas Press.

Spence, J. T., and Helmreich, R. L. (1980). Masculine instrumentality and feminine expressiveness: Their relationships with sex role attitudes and behaviors. Psychology of Women Quarterly, 5, 147-163.

Swanson, E.B. (1982), "Measuring user attitudes in MIS research: a review", Omega International Journal of Science, Vol. 10 No.2, pp.157-65.

Taylor, H. J., Kramarae,C. & Ebben, M. (Eds.),(1993) Women, Information Technology, and Scholarship (pp.52-61). Urbana. IL: Center for Advanced Study.

Terman, L. and Miles, C. (1936). Sex and personality; studies in masculinity and femininity. New York: McGraw-Hill.

Todman, J., & Day, K. (2006). Computer anxiety: the role of psychological gender. Computers in Human Behavior, 22, 856-869.

Trevino, L.K., Webster, J. (1992), "Flow in computer-mediated communication", Communication Research, 19(5), 539-73.

Turkle, S. (1984). The second self: Computers and the human spirit. New York: Simon and Schuster.

Venkatesh, V. (2000). "Determinants of Perceived Ease of Use: Integrating Control, Intrinsic Motivation, and Emotion into the Technology Acceptance Model," Information Systems Research 11(4), 342-365.

Warner, Rebecca M., (2008) Applied Statistics, SAGE Publications, Los Angeles.

Webster, J. (1989) Playfulness and Computers at Work, doctoral dissertation, New York University.

Webster, J. and Martocchio, J., (1992), Microcomputer Playfulness: Development of a Measure with Workplace Implications, MIS Quarterly, 16(2) 201-226.

Webster, Trevino, and Ryan (1993). The dimensionality and correlates of flow in human-computer interactions. In Computers in Human Behavior, 9(2), 411-426.

Weinberg, S, English, J., and Mond, C., (1981). A stratagem for reduction of cyberphobia. Proceedings of the American Association for the Advancement of Science Convention.

Whitley, B. (1997). Gender Differences in Computer-Related Attitudes and Behaviour: A Meta-Analysis. Computers in Human Behaviour, 13, 1-22.

Wilder, G., Mackie, D., & Cooper, J. (1985). Gender and computers: Two surveys of computer-related attitudes. Sex Roles, 13, 215-229.

Women's Foundation of Colorado, Status of Women and Girls in Colorado: Women in Technology Report. (2001). Retrieved April 27, 2004 from http://www.wfco.org/statusreports.htm

Woszczynski, A. B. (2000) Exploring the Theoretical Foundations of Playfulness in Computer Interactions. Doctoral Thesis. UMI Order Number: AAI9992590., Clemson University.

Woszczynski, A. B., Roth, P., & Segars, A. (2002). Exploring the theoretical foundations of playfulness in computer interactions. Computers in Human Behavior, 18(4), 369-388.

Yager, S. E., Kappelman, L. A., Maples, G. A., and Prybutok, V. R. (1997). Microcomputer playfulness: stable or dynamic trait?. *SIGMIS Database* 28(2), 43-52. DOI= http://doi.acm.org/10.1145/264701.264704

Zoghi, C. and Pabilonia, S. W. , (2004). "Which Workers Gain from Computer Use?" BLS Working Paper No. 373. Available at SSRN: http://ssrn.com/abstract=562062

Vita

Herbert L. Coleman was born in Lincoln, Nebraska. His father was in the US Air Force so the family moved several times to U.S. Air bases around the country throughout Herbert's primary education. His secondary and higher education took place in the state of Texas. After attending the Creative Arts Magnet High School and studying television production at Skyline High School, he graduated from Justin Ford Kimball High School in Dallas, Texas. He went on to earn a Bachelor of Science degree from East Texas State University (since renamed Texas A & M – Commerce) with a double major in Radio-TV Production and Psychology. He later attended Southwest Texas State University (since renamed Texas State University) where he earned a Masters in Education in Curriculum and Instruction with emphasis in community college instruction and psychology. He went on to teach as an adjunct in the Austin Community College Psychology department and work in Student Development as an Academic Advising Supervisor. He later shifted to the Instructional Resources and Technology Department where he served as an Instructional Technology Manager and currently serves as Director of Instructional Computing and Technology. He continues to teach psychology and work with faculty on the implementation of technology in their teaching. Upon completion of his Ph.D. he plans to continue his research in gender role personality traits and technology while he continues to help faculty integrate technology into their curriculum.

Permanent address: 2302 Lasso Round Rock, TX 78681

This dissertation was typed by Herbert L Coleman.